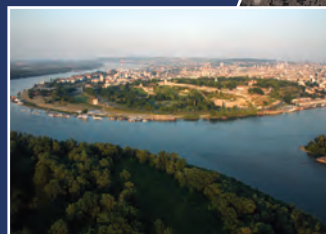


Challenges of spatial development of Ljubljana and Belgrade

Edited by
Marko Krevs
Dejan Djordjević
Nataša Pichler-Milanović

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Univerza v Ljubljani
Filozofska fakulteta, Oddelek za geografijo

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Marko Krevs, Dejan Djordjević, Nataša Pichler-Milanović

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Authors: Tijana Dabović, Mirjana Devedžić, Dejan Djordjević, Aleksandar Djordjević, Dejan Filipović, Dragica Gatarić, Mirko Grčić, Marko Krevs, Simon Kušar, Bogdan Lukić, Radmila Miletić, Marija Nevenić, Danijela Obradović-Arsić, Darko Ogrin, Matej Ogrin, Mirko Pak, Nataša Pichler-Milanović, Dušan Plut, Ivan Ratkaj, Dejan Rebernik, Velimir Šečerov, Metka Špes, Srboljub Stamenković, Branka Tošić, Dragutin Tošić, Gordana Vojković, Zora Živanović

Book edited by: Marko Krevs, Dejan Djordjević, Nataša Pichler-Milanović

Responsible editors: Metka Špes, Darko Ogrin

Reviewers: Jernej Zupančič, Jasmina Djordjević

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**Marko Krevs, Dejan Djordjević,
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Contents

Preface	7
Marko Krevs	
1. Introducing Ljubljana	9
Mirko Pak	
2. Introducing Belgrade	17
Branka Tošić	
3. Physical-geographical factors relevant for the development of Ljubljana	27
Darko Ogrin	
4. Physical-geographical factors of the development of Belgrade	37
Danijela Obradović-Arsić, Dejan Filipović	
5. Ljubljana in the system of settlements and centres	55
Simon Kušar, Nataša Pichler-Milanović	
6. Urban settlements network - instrument of the spatial-functional organization of the Republic of Serbia	71
Dragutin Tošić, Marija Nevenić	
7. Demogeographic characteristics and processes in Ljubljana	85
Dejan Rebernik	
8. Demogeographic characteristics and processes in Belgrade	101
Gordana Vojković, Mirjana Devedžić	
9. Daily urban system of Ljubljana	119
Nataša Pichler-Milanović, Marko Krevs	
10. Daily urban system of Belgrade	129
Srboljub Stamenković [†] , Dragica Gatarić	
11. Social urban geography of Ljubljana	143
Dejan Rebernik, Marko Krevs	
12. Spatial structures and functional organization of Belgrade	159
Ivan Ratkaj, Mirko Grčić	
13. Economic aspects of spatial development of Belgrade	181
Radmila Miletić	
14. Road traffic in Ljubljana	199
Matej Ogrin	

15. Transport infrastructure as development factor of Belgrade	207
Bogdan Lukić, Velimir Šećerov	
16. Spatial-functional transformations of the metropolitan area of Ljubljana	221
Dejan Rebernik	
17. Spatial-functional transformations of the metropolitan area of Belgrade	229
Branka Tošić, Zora Živanović	
18. Pollution and environmental protection in Ljubljana	249
Dušan Plut, Metka Špes	
19. Environmental aspects of the planning and development of Belgrade	269
Dejan Filipović, Danijela Obradović-Arsić	
20. The Role of Strategic Planning in Development of Ljubljana	287
Nataša Pichler-Milanović	
21. Strategic planning as an instrument of spatial development of Belgrade	301
Dejan Djordjević, Tijana Dabović	
22. Roles of geoinformatics in spatial development of Ljubljana	323
Marko Krevs	
23. Geo-information aspect of planning of Belgrade	335
Aleksandar Djordjević	
24. Comparative synthesis of the challenges of spatial development of Ljubljana and Belgrade	351
Marko Krevs	
25. Izzivi prostorskega razvoja Ljubljane in Beograda	361
Marko Krevs	
References	378
List of figures	401
List of tables	404
Index	407
List of authors	419

Preface

Marko Krevs

Aren't Ljubljana and Belgrade just too different to be compared? This has even been a spontaneous first reaction of several authors of this book, and a reader could ask just the same question. However, as the circle of researchers from diverse fields discussing the developmental factors and challenges of the two cities expanded, and the communication intensified, the idea of preparing a book combining research results, knowledge and ideas of both teams of researchers became both interesting and feasible.

The person initiating the cooperation within a bilateral cooperation between Department of Geography in Ljubljana and Geographical Faculty in Belgrade, titled "The role of strategic planning, EU comparative data and GIS for spatial development of Central European cities: the case of Ljubljana and Belgrade", has been Nataša Pichler-Milanović. This cooperation has been financed on the basis of an Agreement for cooperation in science and technology between the Republic of Slovenia and Republic of Serbia in the years 2008 and 2009. The finances from this source have been limited only to support the travel and accommodation during the bilateral visits, but they offered the necessary conditions for growth of the idea of the book. Although the formal as well as majority of organizational burdens of the cooperation, preparation of the book and further fund rising have been carried out by Dejan Djordjević and myself, the credits to prepare the grounds for the cooperation go to Nataša, functioning as a symbolic bridge between her both home cities.

This book is a document of time in the life of the two cities, and contains a transection of the recent research of Ljubljana and Belgrade at the two institutions involved. The editors and the authors are well aware that the book cannot cover all the important aspects of the spatial planning and development of Ljubljana and Belgrade. However, the situation and challenges of development of the cities are addressed in a complex geographical and spatial planning manner, from the aspects of physical-geographical factors of development, positions of the studied cities in the system of settlements and centres, demographic characteristics and processes, daily urban systems, social urban geography, economic geography, transport infrastructure, spatial-functional transformations of the metropolitan areas, environmental situation, strategic planning, and geoinformatic support to planning and development. The chapters are in principle prepared in parallels, one for Ljubljana, and the next for Belgrade, addressing similar topics. Such a complex and systematic approach gives the book a monographic character, and will hopefully get appropriate place among main references on spatial development of Ljubljana and Belgrade in the beginning of 21st century.

Thanks to all the authors for all their highly valued contributions to the overall contents and quality of the book. Editors thank them all to submit their contributing chapters on time and ask them to excuse that the editing took, well, quite longer than expected. Special thanks to Tanja Koželj for her cartographic contributions, to Jerneja Milost for her patient involvement in technical preparation of the materials for the book, and to all not mentioned who contributed to the research or preparation of the book. In the name of the editors, authors and interested readers I also sincerely thank all the financiers,

namely Javna agencija za knjigo Republike Slovenije, Mestna občina Ljubljana, Oddelek za geografijo Filozofske fakultete Univerze v Ljubljani and Geografski fakultet Univerziteta u Beogradu to make this publication possible.

Finally, I would like to ask the readers, in the name of all the participating authors in this book, to excuse us for imperfect use of the English language. The authors take the responsibility for the translations of their original texts, and several translators have been involved in the process, but our resources did not allow us to do some harmonization of the language and style of expression. Nevertheless we sincerely hope that the message of the individual chapters, and of the book as a whole, will reach the interested readers.

Marko Krevs

I. Introducing Ljubljana

Mirko Pak

I.1. Position

Ljubljanska vrata are one of the most important European transport junctions. Here, in the extensive Ljubljana Basin, at the junction of the Alpine and Dinaric land, Ljubljana developed in the valley 1.5 km wide and between the western and eastern Alpine foothills about 400 m high. By the middle of the 20th century, development of Ljubljana was limited to the gravelly Ljubljansko polje, extending north of Ljubljanska vrata to the Sava River which was more suitable for construction; later, the construction intensified also in the humid Ljubljansko barje which was under a constant threat of floods.

Ljubljanska vrata are the junction of major European transport directions that connect Ljubljana and the entire Slovenia with large and economically important European regions which are significant for their economic, developmental, cultural, social and political diversity, and thus provide for their interconnection. Ljubljana is situated on the junction of two important European traffic corridors, the 5th and 10th transeuropean corridor. The 5th corridor, running in the direction Barcelona – Lyon – Venice – Ljubljana – Budapest – Lvov – Kiev, connects South Europe from the Pyrenees Peninsula to Ukraine and Russia in the east. The 10th corridor runs in the direction Salzburg – Jesenice – Ljubljana – Zagreb – Belgrade – Skopje – Athens, with a branch to Zidani most – Maribor – Graz – Vienna (Černe, 2002, 193). Thus, Ljubljana connects a significant part of Europe with the Balkans and the entire SE Europe, and further with Asia Minor and Middle East. With the construction of the Slovene motorway cross, transit road freight transport has significantly increased in the past years. Through Postojnska vrata, the fourth traffic branch connects the Europe through Ljubljana also with tourist regions on the eastern Adriatic coast, with Istria, Quarnero and Dalmatia, and the northernmost Mediterranean seaports Koper and Trieste. This extraordinary traffic and geographical position, as well as openness towards eastern European countries, favoured Ljubljana already before 1991, when it was just one of the republic centres, with numerous development advantages, and provided for a intensive economic connection with those countries.

Ljubljana has the central geographical position in Slovenia and is the centre of the transport, economic and population cross with an extremely wide gravitation area which includes in certain segments almost the entire state territory. This is indicated by a rapid development of the city and strong suburbanisation of the entire Ljubljana basin. Construction of the Slovene motorway cross which will strengthen the role of bigger urban centres, will also strengthen the role of Ljubljana (Plevnik, 2000, 241).

I.2. Historical development of Ljubljana

The formation and development of Ljubljana is closely associated with its position near Ljubljanska vrata, where the antique settlement Emona developed at the most favourable crossing from the Apennine peninsula to Podonavje, and was ruined around the year 580. As a settlement, Ljubljana was developing gradually between the castle hill and Ljubljanica,

to occupy in the middle of the 13th century a leading position in the emerging Carniola. It became the capital of the county and state. In 1335, it came under the direct Hapsburg authority and oriented its development into transit trade and finance. At the end of the Middle Ages, it had 4 to 5 thousand inhabitants (Enciklopedija, 1992, 223). Ljubljana recovered in the early capitalism when, besides transit trade, some processing plants developed. The city was settled by large capitalists, and the economic area of Ljubljana spread also towards east. This resulted in a more vivid construction of the city and arrangement of the near environment so that in 1754, it had 9,400 inhabitants (Enciklopedija, 1992, 225).

In Illyrian Provinces (1809 – 1813), Ljubljana was a seat of the general governor and the capital of the territory from Hohe Tauern to Boka Kotorska in Montenegro. In the middle of the 19th century, when it operated only in the function of provincial government, its gravitation area decreased. Such condition, with only a short interruption, was preserved almost until the First World War (Enciklopedija, 1992, 225).

Among large Slovene cities, in the first half of the 19th century Ljubljana was the least industrial. It was characterised by small craft industrial and industrial businesses. Further development of Ljubljana was provided by the railway Vienna – Trieste which was constructed in 1849 – 1857. With other railway connections finished by the end of the century, Ljubljana became an important railway junction and one of the most important geostrategic points in this part of Europe, somewhat as a door to the Balkans towards the Adriatic Sea, and towards the entire SE Europe and East Mediterranean.

At the end of the 19th century, Ljubljana gradually overtook the leading role in political, economic and cultural life of Slovenes. The beginning of modern Ljubljana reaches back before the earthquake in 1895 when the city centre was severely damaged and Ljubljana was granted a significant aid and favourable legislation in respect of the post-earthquake reconstruction. In 1929, Ljubljana became the capital of Drava Banovina in Slovenia. With the dissolution of the Hapsburg monarchy, the significance of certain provincial institutions was extended to the entire Slovenia. Special meaning was attributed to the establishment of the longed-for University (Enciklopedija, 1992, 227 - 228). In 1931, it also obtained the function of the biggest Slovene economic centre with 60.000 inhabitants. In comparison to other industrial cities, the number of inhabitants of Ljubljana was growing at a slower pace and hardly doubled in the period 1869 – 1910 (Poselitev, 1998, 21).

With the formation of Yugoslavia in 1919, the significance of Ljubljana as Slovene capital became even stronger. The city was spreading along main radial roads outwards. In 1935, some neighbouring municipalities were joined to the city, which increased its surface to 6,500 ha and the number of inhabitants to 80.000. Rapid increase in the number of inhabitants during the period 1895 – 1910 was followed by a slow-down after the First World War, while the vivid urbanisation of neighbouring settlements continued. A development scheme of the Ljubljana urban agglomeration was elaborated in 1926, and it was already in the sixties that the city was spreading into its surrounding (Vrišer, 1956).

In the period 1931 – 1945, the increase in the number of inhabitants of Ljubljana slowed down.

During the Italian occupancy in the Second World War, Ljubljana was surrounded by a barbed wire fence, boundary blocks and strongholds (Korošec, 1991, 187). This was followed by a more rapid growth of the city, strengthening of its functions, extension of the

Ljubljana influence area on the entire Slovenia, and spread of the dominant Ljubljana influence onto the major part of Slovenia. The position of Ljubljana near the “western boundary” which was more and more opened already in the sixties, meant also numerous new functions that were taken over from the entire Yugoslavia, related in particular to economic connectedness with Western European countries. This contributed to a significant intensification in daily migrations to Ljubljana and its extensive suburban hinterland where increase in the number of inhabitants in the last twenty years has been faster than in Ljubljana. The natural increase was low or even absent. However, the number of workplaces was increasing rapidly.

In the period 1948 – 1981, the share of Ljubljana inhabitants increased from 8.3 % to 14.4 %. However, during the 1997 – 2007 decade, the number of inhabitants of Ljubljana decreased by 1.777, and of the Urban Municipality of Ljubljana by 7.520, due to suburbanisation of the area which was spreading. Suburbanisation has contributed to the negative migration balance of the Urban Municipality of Ljubljana together with almost all municipalities of the Ljubljana region in the past years (Statistični letopis, 2008). Due to immigrations, the share of non-Slovene inhabitants increased after 1961, from 9 % in 1971 to 19.6 % in 1991 (Enciklopedija, 1992, 234). Construction of apartments of blocks at the skirts of the city centre and of the city attracted inhabitants living in the city centre where the housing function was decreased also on the account of expansion of service activities.

The number of workplaces in Ljubljana increased from 142.000 in 1997 to 191.000 in 2007. After 1971, employment in non-commercial activities was increasing at a faster pace than in commercial; the share of employees in numerous small and various industrial installations amounted in Ljubljana to 21 % and was the lowest among Slovene cities.

When Slovenia gained independence, Ljubljana became the capital of the state and thus obtained numerous new functions. Ljubljana is also an expressive regional centre situated on the most favourable strategic junction between the Middle and South-Eastern Europe. It also became competitive with the capitals of neighbouring countries, with other republic centres of the former Yugoslavia, and with neighbouring cities of a comparable size, such as Trieste and Graz (Pichler, 2001, 72).

Ljubljana is first of all a business, cultural, university and research centre of Slovenia, with tourism representing an important development potential. Moreover, Ljubljana is also Slovenian the strongest economic centre. Companies with registered offices in Ljubljana hold one third of the Slovene capital, one third of the value added, and somewhat less than one third of transactions and net income, and provide employment for one quarter of all employees. Besides, the Ljubljana economy is favoured by an advantageous sectoral structure, and the Urban Municipality of Ljubljana and its urban region are the most developed areas in Slovenia (Pichler, 2001, 74).

A rapid economic and general social development influences the specific development of the city and its urban region. After 1995, private capital was intensively invested in housing construction, in the construction of shopping and service centres, and of business zones. In this way, the city construction concentrates on empty areas in the city and its periphery. Numerous empty surfaces of former industrial and construction companies and storehouses are being under construction, as well as of former military restricted areas and other empty spaces. After 1993, the BTC shopping centre emerged on the location of the

former railway storehouse at the north-eastern city skirt, with over 110.000 m² of shopping surfaces, spreading its influence over the entire Slovenia and also across the state border (Rebernik, Jakovčič, 2006, 23). After 1991, suburbanisation became even faster and spread into new areas and into urban settlements (Rebernik, 2007, 37). Such concentration of workplaces and service activities raises the problem of traffic arrangement in Ljubljana and its urban region as one of the basic development problems.

I.3. City size and its administrative division

The new legislation adopted in 1993 gave rise to extensive changes in relation to the administrative division in Slovenia. The legislation provided for the abolishment of big municipalities and contributed to the formation of numerous small municipalities. After more than 30 years, the five municipalities of Ljubljana which, except for the Centre municipality, encompassed, in addition to the city territory, also the extensive urbanised city periphery, joined in the Urban Municipality of Ljubljana. The city faced a significant expansion towards east, while in the southern and western part it maintained the traditional extent, and in the northern and north-western part only a small expansion occurred (Vrišer, 2000, 22). Thus, the Urban Municipality of Ljubljana encompassed 38 settlements on the surface of 275 km² which had, according to the 2002 census, 265.881 inhabitants, meaning the density of 967 inhabitants per km². Between 1997 and 2007, Ljubljana lost 5 % of inhabitants, while in the Ljubljana urban region, which is as from 1998 constituted by 26 peripheral municipalities and is completely in accordance with the Central-Slovene statistical region, the number of inhabitants has increased to 493.345 by 2007. Economic centralisation at the state and regional level contributed to the increased number of inhabitants and workplaces in the Ljubljana region. In 2002, there were 212.000 workplaces in the Ljubljana urban region, of which 87 % in Ljubljana, 9 % in the narrower and 4 % in the wider urban region (Ravbar, 2002, 226).

Change in the conception of the local government resulted in local communities losing their importance, which were enforced by amendments to the Constitution of the Republic of Slovenia in 1974 and operated as a sort of municipal branches, and also provided for local interests. Instead, in 2000 Ljubljana was divided into 13 functional quarter communities (Vrišer, 2002, 22), units of local self-government concluded in terms of their functional and gravitational character, which have a direct influence on the quality of living of the inhabitants and enable them to participate in spatial planning.

I.4. Geographical studies of Ljubljana

Ljubljana has always been in the focus of interest of Slovene geographers. It was already in 1930 when A. Melik published an extensive study on the development of Ljubljana in *Geografski vestnik*. He included two extensive chapters also in the regional outline "Posavska Slovenija" (1959) and in the book "Rast naših mest v novi dobi" (1964), dealing with the issues related to the development of Ljubljana. In 1959, I. Vrišer published an extensive analysis of the development of inhabitants for the needs of the Ljubljana urban plan in an independent publication.

In the 1960s and 1970s, the problems of rapid development of the city, of its outskirts, suburbanisation and rapid structural changes were the subject of many geographical studies. It was not by coincidence that the researches on socio-geographic problems were first focused on socially degraded areas in the city centre and its outskirts (M. Pak, A. Bervar, N. Škerjanc, M. Krivic and others), and an issue of the newspaper *Časopis za kritiko znanosti* was dedicated to such type of geography studies.

Numerous studies on the sociogeographic structure of Ljubljana (M. Pak) which included more and more frequently its morphological and functional structure, saw their upgrading in the doctoral dissertation "Socialna geografija Ljubljane" (1999) by D. Rebernik who emphasised in his studies also the morphological structure as well as social and morphological division of Ljubljana. In this period, geographical studies also dealt with Ljubljana industry (M. Cerkenik), its economic (Vera Kokole) and functional structure (M. Pak, R. Genorio) and supply function (M. Pak). Planning was the subject of many studies of the development of Ljubljana inhabitants (A. Jakoš).

In the 1980s and in particular 1990s, the number of geographical studies of Ljubljana increased significantly. The number of researchers increased, theoretical and methodological concepts of studies intensified, while from the contextual point of view, geographical studies included most issues in relation to city space, city buildings and ecology, and partly its urban region. Geographical studies of Ljubljana gain on the applicative character, mostly for the needs of its urban planning.

Geographical studies on ecological problems of Ljubljana deal with various elements of the use of physical space (Smrekar), noise, air pollution (M. Špes, B. Lampič, D. Ogrin and M. Ogrin, D. Cigale, D. Plut), water resources and water supply (V. Brečko, D. Plut), and the quality of the environment in general (D. Plut). Considering the risk of earthquakes for Ljubljana, studies of such type are important (M. Orožen); numerous studies were undertaken of Ljubljansko barje and the related risk posed by floods in the south part of Ljubljana (A. Lah, J. Kolbezen, M. Orožen).

During the last two decades, sociogeographic studies of Ljubljana have also focused on new elements: transport (A. Černe, A. Plevnik, S. Gabrovec, D. Bole, B. Pavlin); recreation of urban population and tourism (M. Jeršič, D. Cigale); economic issues (D. Bole); certain special forms of agricultural use of land (A. Smrekar, B. Lampič, D. Kladnik, I. Rejec); new shopping centres (M. Pak, D. Rebernik, F. Stare); post-war apartments of blocks (M. Pak); ethnic structure (M. Pak, P. Repolusk); division of the city aiming at forming city quarters (A. Rus); suburbanisation issues (M. Ravbar, D. Rebernik); and the position and function of Ljubljana in the urban system of Slovenia and of the wider European region (N. Pichler). Sociogeographic problem (D. Rebernik), functional and morphological structure (M. Pak, D. Rebernik), and population problem (A. Jakoš, D. Rebernik, D. Dolenc) are still the focus of geographical studies of Ljubljana.

The results of the research project "Geografska analiza Ljubljane in njene razvojne možnosti" were published in 2002 by the Department of Geography Faculty of Arts in the publication "Geografija Ljubljane", by extensive contributions about the city area, water resources, environmental problems, sociogeographic structure, standard of living, functional structure, tourism and leisure-time function, passenger traffic, and suburbanisation. Meeting of Slovene geographers in 2000 in Ljubljana was also a significant con-

tribution to geographic researches of Ljubljana. Numerous papers on the development and structure of the city, environmental problems and the problem of suburban region are included in the collection of scientific papers "Ljubljana – geografija mesta", Ljubljana 2000. Besides, numerous geographical studies were conducted for the needs of urban and regional plan of Ljubljana and its urban region by the Urban Planning Institute of the Republic of Slovenia and other institutes.

1.5. Urban planning of Ljubljana

Development of the modern Ljubljana dates back into the second half of the 19th century when the city started to spread from its medieval centre and its suburbs towards north and west along main traffic lines that connected the old city centre with its surrounding.

After the railway Vienna – Trieste was built in 1857, the building-up of the city intensified and empty surfaces between the old city and the railway in the north were arranged. Industry was poorly developed. All big investments were undertaken by aliens. Construction development of Ljubljana was regulated by the 1857 building order that applied for Carniola. An important role in the construction of the new Ljubljana was played by a Carniola building company that built-up an extensive surface in the western part of the city (1873), which it had built-up and arranged already before the 1895 earthquake. (Mihelič, 1983, 7).

According to the company's plans, the western part of Ljubljana was divided by means of a right-angled network of streets into symmetrical building blocks and arranged into a representative city quarter. It was already before the earthquake, that districts between the old city and the railway were given the layout significant for urban settlements in the 19th century (Mihelič, 1983, 8).

The 1895 earthquake represented a crucial breaking point in the urban development of Ljubljana. First serious discussions were raised on the future development of the city; in 1896, the first official urban plan was prepared which was the basis for carrying out urban policy in the city (Mihelič, 1983, 15). The City Council invited a Vienna architect C. Sitte to carry out the first regulation plan for Ljubljana, but it decided for the draft regulation plan proposed by a Slovenian architect Maks Fabiani, to which he included an exhaustive report and explanation of the idea on the city layout (Korošec, 1991, 148). Fabiani envisaged Ljubljana's development within the limits of the north railway, regulation of the northern part of the city and its connection with the city centre, and addressed the problem of city transport. The issue was raised in relation to the city's complex renewal and renovation, growth, organisation, traffic planning and layout (Mihelič, 1983, 11).

During the two World Wars, Ljubljana became the administrative and political centre of Slovenia; 1918 was the year when its economic and political role strengthened. Nine peripheral municipalities were joined to the city which contributed to their improvement and construction of the transport, municipal and other infrastructure (Korošec, 1991, 159). Faster urban development of Ljubljana was the focus of efforts made by architects Jože Plečnik and Ivan Vurnik at the Chair of Architecture of the newly founded Slovene university. Plečnik devised Greater Ljubljana as a concentric city. He realised most of his ideas in the city centre where he joined artistic heritage of the previous centuries (Plečnik's Ljubljana). Vurnik contributed considerably to the housing construction by planning big hired hous-

es; the verge of the densely built-up city skirt was the area where quarters of bourgeois vil-ladoms emerged, while the humid southern area was occupied by modest working-class colonies. During these thirty years, one of the highest buildings in this part of Europe was built in Ljubljana, the skyscraper as the symbol of the modern city (Poselitev, 1998,72).

During the two World Wars, urban development of the city was still regulated by the valid 1869 regulation plan. In 1939, the regulation plan for Ljubljana and the nine neighbouring municipalities was adopted. In 1940, the urban municipality opened a general Yugoslav invitation to tender for elaboration of the outline scheme; however, this did not influence significantly the post-war development of Ljubljana, when among other assignments (housing, workplaces, recreation and traffic), housing and industrial construction were pri-oritised (Mihelič, 1983, 21).

In the first post-war period, spatial structure of the city was characterised by an intensive housing and industrial construction. Beginning of the modern urbanism that complied with the European practice reaches back in the sixties when the Ljubljana Urban Planning Institute (LUZ) was founded. In 1965, the latter submitted the General Urban Development Plan of Ljubljana for discussion which was approved in 1966. It maintained the star-like (shank-like) physical city structure and envisaged significant changes in the traffic network with new by-pass railway lines, the motorway system and regulation of city inroads; hous-ing areas were divided according to the theory of neighbourhood, while spatial struc-ture started to reflect also the administrative structure of the five Ljubljana municipalities (Mušič, Poselitev, 1998, 86).

The General Urban Development Plan gave a new image and meaning to the city centre. The main deficiency of the plan was that the territory it encompassed was too small (Pros-torska zasnova, 2002, 4).

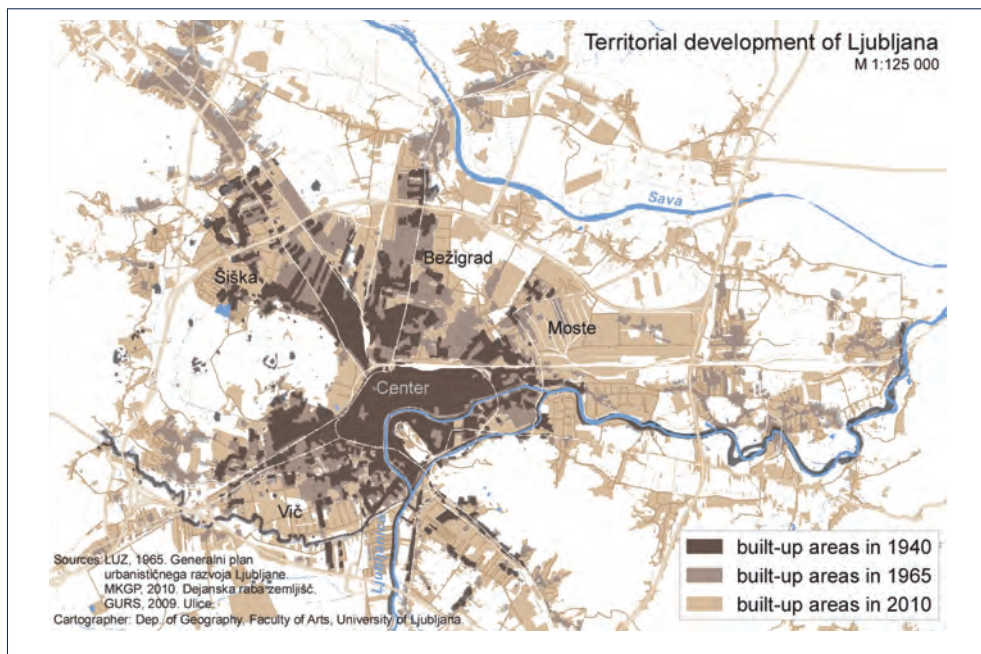
At the end of the seventies, work for a new long-term plan and new urban design of the city started, entitled Ljubljana 2000. The draft was approved in 1985. However, the renewed draft did not reflect all the ongoing transformation processes. The result was an uncon-trolled growth of too many shopping centres in the suburbs which are still growing as to their extent and number, empty shops in the city centre, unbalanced housing construc-tion and unfinished land policy, as well as an enormous traffic density in the city. The urban image of Ljubljana also started to reflect its function of the state capital (Mušič, Poselitev, 1998, 86). An important novelty was the need for decentralisation or strengthening of sub-urban settlements or local centres which are today independent municipal centres. Con-nection of the city and its area of influence, from which about 100.000 commuters arrive to Ljubljana daily, will be empowered by the construction of a motorway system and further development of the means of telecommunications (Mušič, Poselitev, 1998, 98).

Between 1990 and 1991, the constitutional system was changed completely. Social plan-ning was abolished, while spatial planning elements of the planning document still apply. At that time, privatisation and decentralisation started. It was the high time for the elaboration of a new development plan which would be aiming at coordinating the interests in space in accordance with an integral concept of spatial development and the principles of sustainable development of the city which provide for the protection of the environ-ment, mixing of different uses in the city, protection and development of the city iden-tity, and an emphasised development of public transport (Prostorska zasnova, 2002, 4 and

5). In 2002, the Urban Municipality of Ljubljana adopted two documents that determine further spatial development at a strategic level. The strategy of sustainable development of Urban Municipality of Ljubljana and the Resolution on National Development Projects 2007 – 2023 established the framework of the future spatial development of Ljubljana as a national centre and the major national traffic junction, which is to develop into an internationally competitive capital on contemporary principles of maintaining the quality of the environment and more reasonable management of the space (Strateško prostorski, 2007, 4). In 2007, Urban Municipality of Ljubljana presented the vision of spatial development by 2025 which is the basis of a new city spatial plan under elaboration (Urbanistično načrtovanje, 2008), the adoption of which has already seen many prolongations due to new proposals as to the use of physical space.

Urban Municipality of Ljubljana is the centre of Ljubljana urban region which encompasses 24 municipalities with one quarter of Slovene inhabitants (491.000), which provides workplaces for one quarter of the Slovenian active population, and to which about 30.000 persons commute to work every day, while economic concentration being even essentially higher. The settlement of the Ljubljana urban region has been lately under the influence of the processes of urbanisation, suburbanisation and formation of conurbation. On this account, and because of the opportunity for the Ljubljana urban region to become one of the central administrative, academic and economic centres in the European Union, Regional Development Programme for the Ljubljana urban region is under elaboration (Regionalni razvojni, 2002, 4 and 7).

Figure 1: Territorial Development of Ljubljana.



■ 2. Introducing Belgrade

Branka Tošić

2.1. Position

Belgrade, the capital and the largest city in Serbia, has very favourable and significant traffic-geographic position within the Serbian, Balkan and European space. It is located at the border of Middle Europe and the Balkan Peninsula, i.e. at the border of the Pannonian basin and the Šumadija region, where the spur of the mountains of Šumadija mostly extended out into the spacious plain in the north. The cape, on which Belgrade lies, is cut by terraces and it suddenly slopes down to the confluence of the Sava and the Danube.

The position of Belgrade is favourable, first of all, due to the fact that it is intersected by two long navigable rivers which represent important corridors. The Pannonian plain, as very convenient way to Middle Europe, extends in the north. On the other hand, the way through the Balkan Peninsula is opened towards Istanbul and Asia Minor, facilitated by the meridian valleys of the Velika Morava, Južna Morava and Vardar (Macedonia) towards Greece and the Aegean Sea, i.e. by the branch through the Nišava and Marica valleys. Moreover, the city is positioned where the two out of ten European corridors (VII and X) intersect, which enables the connection with the network of the Danube and other European metropolises. Owing to its position, Belgrade has great potential advantages for taking the leading role in connecting and integrating Serbia into broader economic, social and political geo space. The causes why it has not been achieved should be found in the fact that it was the battlefield of the struggles for dominance for centuries, which, after all, could be seen from its historical development.

2.2. Historical development of the settlement

In the 4th century BC, the Balkan Peninsula was inhabited by the Celts who founded Singidunum (present-day Belgrade) aiming to use the natural superiorities of the position (Stojadinović M, 1927, 9). In the 1st century AD, Singidunum was taken by the Romans who built the first fortress at the confluence of the Sava and the Danube (Bojović D, 1975, 71 - 85). The civil settlement extended south from the fortress, with constructed trade centre, administrative and religious centres and Roman thermae. The well-off inhabitants had their properties in the surroundings of the city. The arts of this period were characterised by the early Christianity. The frequent breaks of the barbarians during the 5th, 6th and 7th centuries weakened the borders of the Roman Empire and the defence capability. By the middle of the 5th century, the Huns took the fortress, conquered the city, robbed it and left it in the ruins. Thereafter, it was conquered by the Sarmatians, the East Goths, and then by coming under Byzantine rule the city was restored (Todorović J, et al., 1963, 25 - 36). By the beginning of the 7th century, Singidunum was considerably inhabited by the Slavs. Over the ruins of the antique and early Byzantine Singidunum, soon the new city was built under the Slavic name - Beograd. The arrival of the Hungarians in the Pannonian Plain at the end of the 9th century greatly changed the balance of power in this part of the Balkans, and Belgrade often changed its owners. From the 9th to 12th centuries the city was com-

ing under rules of Bulgaria, Byzantium and Hungary. At the end of the 13th century Belgrade for the first time came under Serbian rule which caused the more intensive settling of the Serbian population (Istorija Beograda, 1974, 147-150). In the following century Belgrade came under the Hungarians who prepared the border areas for the struggle against the Turks. The Turks did not give up the idea of taking the city - the rampart of Christianity (Elezović G., Skrivanić G. 1954, 37 - 76). Belgrade was under Turkish rule from 1521 to 1717, when it changed into the oriental city. At the time of the Austrian occupation in the first half of the 18th century, the great part of the Serbian settlement expanded out of the fortified part of the city. Despite the constant war conflicts, trade, handicrafts, agriculture, fishing, shipping were flourishing. Old fortresses were restored and new ones were built.

By the beginning of the 19th century Belgrade was liberated from Turkish rule and became the military, administrative, political and cultural centre of Serbia. The city had about 10.000 inhabitants and above craftsmen and traders it also attracted educated people from the surrounding countries (Vujović B. 1994, 44). The population also increased. In 1867 Belgrade had around 25.000 inhabitants, in 1900 the number increased on 70.000, while in 1910 the population was around 90.000. At the end of the 19th century many economic facilities were built, as well as railroad tracks, the first ships, power station, horse-drawn trams were introduced, and soon after the electric trams, too. At Knez Mihailo Street, new buildings, shops, cafes, hotels, banks, theatres and other cultural and educational institutions appeared. The city extended in the direction of Slavija and Vračar (present-day inner city core).

During World War I, which lasted from 1914 to 1918, Belgrade was under frequent artillery attacks, so after the liberation the destroyed and robbed city more resembled on the huge military camp. Until 1918 Belgrade was the border city of the reduced gravitational zone and vulnerable geopolitical position, while after that, by adjoining the areas north from the Sava and the Danube, it got the chance for its not only free functional and gravitationally complete and spatial development, but also for the formation of its present-day asymmetrical administrative-territorial unit (Stepić, M, 2003, 21 - 33).

The period between the two world wars was characterised by more intensive development of the city which became an attractive centre for the domestic and foreign capital. In 1940 there were 240 industrial enterprises of about 25.000 workers. The population increase was also significant. In 1921 the population of Belgrade and Zemun was 130.000, ten years later there were 266.000 inhabitants, while in 1940, shortly before World War II, the population number was 430.000. During World War II the city was hit by massive bombing and vast areas of the city were destroyed.

The period of industrialization, after World War II, was followed by the construction of the industrial zones in the periphery, while the zones which passed the phase of the industrialization were in the centre of the city with the high concentration of the population and servicing activities. The industrialization brought to the influx of the population, mainly from other settlements of central Serbia. That influenced the over-population and unplanned growth of the city, followed by the housing and other social problems. The population increased radically by 1981, but later, due to difficulty of settling, the immigration was reduced, while the population growth rate was negative. That would cause the population stagnation in Belgrade in the future. By the time, it came to the population redistribution in some parts of the city. It was redistributed in the suburban municipalities, while elderly population structure prevailed in the central parts, and servicing activities were concentrated in these parts of the city.

From the end of the 20th century the economic strength of Serbia and Belgrade became weak and considerably exhausted. The decrease in the production caused the national income reduction, dismissing of employed, uncontrolled growth of the black market, particularly when the export and import flows were broken off, which had certain socio-economic consequences, such as strengthening the tendencies of the corruption and disturbing the legal system.

2.3. Size of the city and administrative distribution

Today, the Belgrade settlement belongs to the wider administrative area, the Belgrade region or the City of Belgrade, i.e. to the territorial level of the macro-region NUTS 2. In the period after World War II up to the 1970s, this area grew and extended gradually by the municipalities from the surroundings, especially towards the south, to radius of about 60 km¹.

The total area of the administrative area of the City of Belgrade is 3224 km² (3.65 % of Serbia). There have been 157 settlements there, while the total population of the 2002 was 1.574.050 (21 % of the population of Serbia). In the very settlement of Belgrade, there were 1.119.642 inhabitants or 454.408 inhabitants less than in the whole administrative area of the City, i.e. the Belgrade settlement itself comprises 71 % of the population of the administrative area of the City of Belgrade (The Regional Spatial Plan of the Administrative Area of Belgrade - RSPAA, 2004). The area of the City of Belgrade includes 17 municipalities, whereof 10 are the urban ones. In those urban municipalities, either the Belgrade settlement itself or a part of the urban area is situated and some of 26 surrounding settlements of the urban, urbanised or rural type. Other 130 settlements are in one of 7 suburban municipalities. The average population density of the whole area is 407 people per square kilometre.

The proposal of dividing the Belgrade administrative region into smaller territorial units, which would correspond to the NUTS 3 level, has been defined by the latest Regional Spatial Plan of the Administrative Area of Belgrade (2004). However, neither this division nor any other has been accepted legally.

The status of Belgrade, as the centre of the metropolitan area, is not defined. Functional-spatial organisation of Belgrade is closely connected with the spatial organisation of the surrounding areas - the Velika Morava and Kolubara valleys, Srem and south Banat. The administrative area is certainly smaller than the area which could be considered as the metropolitan, especially concerning the Vojvodina part (Tošić B. et al. 2004). The obstacle in the functional expansion of the administrative area of Belgrade was the administrative border of Vojvodina and it became as greater as the legal constitution of the provinces was firmer (Bojović B., Borovnica N. 1998).

¹ By the law of name and the division of the Kingdom on administrative areas from 1929, a special capital administrative whole was constituted, confirmed by the Constitution of 1931, within the structure of which Belgrade, Zemun and Pančevo entered. After World War II, Pančevo was assigned to the AP of Vojvodina as its peripheral town. This functionally unexcused division has existed until the present day as a barrier in the expansion of Belgrade in the north from the Banat side. Zemun, which remained in the structure of the AA of Belgrade, was physically separated from its administrative centre, so that just by the construction of New Belgrade it integrated in its urban whole. By the law of municipal areas and districts in the National Republic of Serbia, the city of Belgrade obtained its inner city zone with 10 municipalities. Finally, in 1961, four more municipalities of its wider surroundings joined Belgrade (Obrenovac, Barajevo, Sopot and Grocka), in order that the municipalities of Mladenovac and Lazarevac also joined this area in 1973. The outer administrative borders of the City of Belgrade have not been changed until today (Šećerov, 2007).

2.4. Characteristics of the Belgrade region

The natural conditions on the area of the Belgrade region, i.e. the administrative area, are very heterogeneous. The most fertile soil is north from the Sava and the Danube (RSPAA). The agricultural areas comprise 2211 km² (69 % of the Belgrade region) and they are being reduced gradually, on average for over 1000 ha per annum, and this is enough to feed not only the population of Belgrade and its administrative area, but the population of the broader areas of Serbia. The forestation of the Belgrade region, in the form of isolated complexes, is about 11 %. The quality of forests has only meliorating-protective and recreation character. The water potentials are different. The alluvial flats of long rivers (the Danube, the Sava and the Kolubara) are rich in underground waters used for the water supplying. The southern, hilly parts are characterised by the small capacity of ground waters and the phenomenon of torrents. By the capacity, almost all alluvial springs exceed the needs of the present users and they can be used for the regional water supplying. Lignite is of great significance for the economic development. The coal zone southwest from the Belgrade settlement, with the area of about 600 km² and the established reserves of 3.4 billion tons, enables the power supplying not only of the economy and the settlements on the territory of the Belgrade region, but also out of this territory. Many factors influence the climate of Belgrade, but most its geographical position. The city is completely opened towards west, north and north-east. According to precipitations, it belongs to the transitional type, from the modified Mediterranean towards the continental (62 cm per year). Wind that blows from southeast is most expressed (MB - Meteorological Bureau, 2002).

The today's Belgrade agglomeration is a complex functional urban system of the urban, less and more urbanised and rural settlements, the integration of which originates from the functional connections and interactions established among its structural elements. The agglomeration has the characteristics of the functionally urban region i.e. arranged spatial system with relatively stable hierarchy of the centres. The urban settlements in the region are differentiated into several basic groups - Belgrade, municipal centres, industrial and housing-industrial suburbs and centres of smaller settlement communities (villages). The functional typology of the settlement points out that there is a wide range of the functional types, from clearly agrarian to industrial and servicing, over many transitional forms (RSPAAB).

Differences in the accomplished social development characterize the territory of the Belgrade region. The areas out of the municipal centres are of the less developed public services, bad housing conditions, weak infrastructural facilities and low qualification structure of the population.

The ecological system of the surrounding of the city is greatly endangered by functioning or not functioning of some systems, illegal construction and undeveloped ecological conscience. The communal system of the city survived more by people's efforts than by technological or organisational conception the large city needs. Traffic is one of the most difficult problems, especially connecting of all parts of the city in the consistent network of the public, railroad and road transportation and further connecting with the regional networks. In the 1990's the system for settling was characterized by complete absence of the corresponding land use policy and other elements concerning housing (public services). The land of the city was considerably used in the inappropriate manner, causing ecological economic and social damages.

Belgrade and its region, consequently, have great problems. In the 1990s Belgrade lost its role of the European metropolis by excluding it from the processes of the European cooperation and integrations. Most part of its economic power and urban identity was also lost.

2.5. Geographical Researches

The capital of Serbia and its surroundings were often treated in the geographical researches in the second half of the 20th century. The studies were very heterogeneous and included many fields of the geographical science, starting from the natural characteristics of the terrain, over the characteristics of the population and settlements, economic activities, traffic function and communal infrastructure to the social living conditions.

The development of the city on a terrain of steep slopes influenced the study of the relief as of the beginning of the Šumadija's reef where the city core lies, so of the coastal lake relief and landslides of the Belgrade surroundings (Jovanović P.), the relief of Podunavlje (Jovičić Z.) or Posavina (Zeremski M.). The climate and waters were studied on the characteristics of winds (Milosavljević M.), insolation and precipitations (Rakičević T.), climate warming (Rakić T.), Belgrade climate (Vujević P.), reconstruction of thermal conditions of Belgrade (Ducić V.), underground waters (Milojević M.), hydrological changes (Gavrilović Lj.), rivers of the Belgrade surroundings (Dukić D.), etc.

The social aspects are associated with the following studies: demographic structure (Penev G.), population mortality (Vojković G.), migration flows (Djurić V.), natural components and national population structure (Spasovski M.), refugees in Belgrade (Lukić V.), changes of the economic population structure and settlement transformation of the Belgrade region (Lutovac M., Veljković A.), development of rural settlements in the region (Kostić M., Lješević M., Cavrić B.) or the characteristic of economy - agriculture of the Belgrade surroundings (Djurić V.), industrial development (Grčić M.) or the study of this activity for the needs of the spatial planning (Veljković A.), the urban traffic intensity, transportation with Belgrade and characteristics of communal infrastructure and water supplying of Belgrade (Ilić J., Lukić B.), tourism in the economy of Belgrade (Stanković S.) and various aspects of the geographical change of Belgrade (Vasović M.).

Many other papers cover different fields of applied geography, e.g. the use of space in the Belgrade region - Nedović Z., as well as the researches made for the needs of the spatial and urban plans of the city and the administrative area. Therefore the reason for publishing the thematic collection of papers titled "Belgrade and its region" (2003) by Faculty of Geography of the University of Belgrade was making the Regional Spatial Plan of the Administrative Area of Belgrade. The monograph is one of the most significant publications, which treats the Belgrade region from the aspect of fundamental geography and from the complex fields of applied geography particularly.

2.6. Planning activities referring to Belgrade settlement and its region

The influence of the historical circumstances under which Belgrade developed was such that the first planning activities of the construction and organisation of the settlement

dated from the second half of the 19th century. The ideas which preceded the making of the first regulation plans had originated from Prince Milos Obrenović who began to change the oriental structure of the settlement. This Serbian ruler adopted the European concept of the settlement structure with straight and wide streets which framed the rectangular blocks.

The first urban projects date back from 1867 when an engineer Emilijan Josimović, by order of Prince Mihailo Obrenović, made the first regulation plan of Belgrade, which together represented the first legislative act in the area of urbanism in Serbia. By that plan, the most important traffic artery of the city - Knez Mihailova Street (today's walking zone in the centre of the city) was marked out. Josimović replaced the amorphous structure of the oriental town, with its numerous narrow and winding streets, by the modern network of streets, intersected at right angles (Maksimović B. 1956, 47, 66, Medaković D. 1976, 271 - 283). In 1878 the first situation plan of Belgrade was made, while during 1894 the proposal on law of construction was made for Belgrade and other towns in Serbia. At the end of the 19th and the beginning of the 20th century many other skilled architects also came to Belgrade by whose works Belgrade was more and more included into the developmental flows of the European construction. The Russian architects who immigrated to Serbia after the October Revolution left, by their creative work, the indelible seal on the architecture of Belgrade.

By World War I (in 1893, 1910 and 1912) three more plans were done, while the last one left the deep trail in the spatial organisation of the central part of the city.

The General Plan of Belgrade, adopted in 1923, was the attempt of arranging the urban-architectural development of the city. The plan was made in scale at 1 : 4 000 and the basic positions of the city were set in relation to the narrower surroundings. The significant expansion of the city towards the south, the activation of the left bank of the Sava, the construction of bridge and a special addition related to New Belgrade were planned. The regulations of the construction were made within the plan, while there were not any instructions concerning outer suburbs, so that poorer citizens built their houses away from the city because they could not satisfy the building regulations and thus they made labour settlements there. Special regulation plans were done for them, by which the existing situation was kept with some corrections (rebuilding plans) and the unplanned development of the city was legalized. Such plans referred only to urgent issues of newly created zones (at that time Senjak, Voždovac, Čukarica, Topčidersko brdo, etc.) which were formed and developed as separate wholes, not much connected with the city. In 1931 Law of Construction with Regulations was made in order to put an end to these phenomena (Šećerov V, 2007).

By the plan of 1927, which was made in scale at 1 : 10.000, it was continued with the trend of the city's organisation and expansion towards periphery parts, especially at the Banat left bank of the Danube. By the last plan of 1939, which was made before World War II at a scale of 1 : 10.000, it was also continued with the trend of organizing and expanding the city to periphery parts.

The ideological plan of Belgrade from 1948 was defined by the key traffic corridors of Belgrade with the surroundings. The construction of New Belgrade on the left bank of the Sava River was the key constructive project of Belgrade after World War II.

In the post-war period Belgrade got two general plans (in 1950 and 1972), so that urbanism became the permanent component in its more intensive development.

By the General Plan of Belgrade from 1950 at a scale of 1 : 10.000, the solutions for the construction of the major facilities and lines of transportation were defined, but many of them have not been realized even until today (the roundabout way has still been under construction). New Belgrade was built in such a way that for a long time it represented a large settlement - a dormitory, but gradually it became independent and received all other functions. Nevertheless, new housing projects were built on the southern Šumadija periphery of the city.

The General Plan of Belgrade from 1972, at a scale of 1 : 20.000, was considerably realized (the ideas concerning the protection of Ratno ostrvo and Ada ciganlija vacation area at Lake Savsko jezero, the construction of sports facilities). Taking the quality of residence and the effects of the urban functions and activities into consideration, the territory of the city, by this plan, was divided into inner and outer urban area, as well as into the suburbs. By the change and supplement of this plan in 1985, the expansion of the city was reduced and the intensification was hurried within the existing area of the city.

The last General Plan of Belgrade was adopted in 2003 and it was done parallel with the Regional Spatial Plan for the Administrative Area of the City of Belgrade. The intentions about this plan were that it should be turned to the process, not the form, to be more flexible in relation to the previous stern forms of the city planning and to be subject to changes and constant planning due to the dynamics of the economic and structural changes in the country and the City itself. This plan sets the position of Belgrade in the wider encirclement as the secondary issue in relation to the local problems of the city itself. The key part of the Plan referred to the regulation of transportation at the edge of the city.

Nowadays, due to laws of property on land, which have not been solved yet, the municipalities of the old core are facing the problem of attracting the investments. In the last fifty years, Law on expropriation was such that the land was deprived to the benefit of the state due to common interests. Today many owners have tried to turn back their property. Many buildings cannot be sold due to unsolved ownership. Considering that the question on property of land has been solved in New Belgrade, and there were not any previous owners in most part of the municipality, many investors from other countries and former Yugoslav republics chose the locations from this municipality (Postić A, 2003). Therefore, New Belgrade has become the significant secondary centre of the capital. Today, this is the largest urban municipality (218.000 inhabitants according to the last census of 2002).

Starting from the first plans and laws up to present days, the urban plans of Belgrade have often been rebuilding, concentrated to the central zones of the city, while less have they been strategic with the perception on the future development of the whole territory of the administrative area of the City of Belgrade.

Belgrade represents the significant, powerful and influential part of the Republic of Serbia in the wider regional surroundings, because of which its spatial development should be observed trans-bordering (interdependently with the municipalities which surround it), trans-nationally (interdependently with the broader European encirclement over the

geographic or functional elements which connect many states) and trans-regionally (functions and interests which connect the city of Belgrade as the region with the other European regions).

The relationship of Belgrade and its region changed its form throughout the time. From the small town of the insignificant functional zone from the end of the 19th century and the first decades of the 20th century, when the present-day intra-urban regions used to be the distant periphery, it has come to the metropolitan of the European rank with much larger influential zone than its own administrative territory. The interregional plans, i.e. the coordinated planning of Belgrade with the adjoining regions, have not been made yet.

The work material, which was made on the occasion of making the project Spatial Planning of the Region of Belgrade - Inter-Report on the Critical Phenomena in the Region of Belgrade in 1975, meant the end of the first phase of diagnosing the administrative area of the City. Based on the work of some methodical units, analytical and synthesized, the final report included: the critical phenomena in the area of the nature, society, economy, facilities, communications and settlement net. Thus the generalisation of the problem in the Region was done through the selection of only those factors which had the regional dimension. Above the administrative area, the functional area of Belgrade, which included 59 municipalities with more than a third of its total population, was also estimated by this plan.

By making the Spatial Plan of the City of Belgrade in 1980, the basic goal was defined on finding the possibilities of moving from the previous unbalanced and centralised form of governing the development to the more balanced and decentralised form on the whole territory of the City and opening the possibility of planning the whole region of Belgrade. The indivisibleness of the planning procedure was clearly defined on sector planning and the trans-border regional cooperation with the inter-municipal regional communities of that time on the territory of Central Serbia was emphasized. By the connection over the Sava and the Danube, Belgrade is opened towards its surroundings. Parallel with the navigable directions, the dominant road directions are also defined, stretching down the Danube valley towards the east, the Sava and Kolubara towards the west and the Velika Morava, i.e. the Avala - Šumadija direction towards the south (the Sumadija reef: Avala - Kosmaj - Bukulja). Connecting Belgrade with adjoining and more distant regions would be done through the system of the central places which already exist or which would be formed at these directions (Šećerov V., 2007).

The last Regional Spatial Plan of the Administrative Area of the City of Belgrade (RSPAA) was adopted in 2004. The plan was made with the intention to activate the potentials of Belgrade in spirit of the sustainable development and to raise the attractiveness and competitiveness of the City similarly to the present European metropolises. The scope of the Plan referred to the urban area of Belgrade, the Belgrade metropolitan and the Belgrade macro-region, i.e. morphologically urban, administrative and functional area.

According to the RSPAA of Belgrade, except 17 municipalities of the administrative area, the level of the functional region also includes the interest municipalities: Pančevo, Stara Pazova, Pećinci, Ruma, Ub, Smedervska Palanka and Smederevo. These 24 municipalities are estimated as the metropolitan area, i.e. as the functional region of the City of Belgrade.

The complex work for the needs of the Plan demanded standardizing the system of the settlements on the territory of the City, its position in relation to Serbia and the possibility of including into the European developmental flows by intensifying the cooperation and applying the projects for the European structural funds. The basic aims of the Plan referred to:

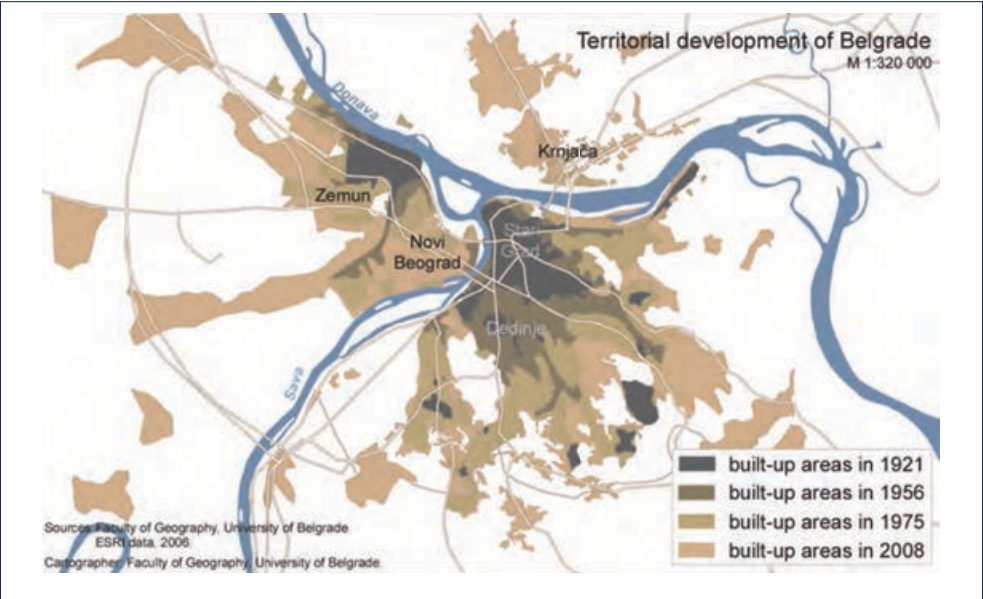
- redefining the role of Belgrade in the European encirclement;
- formation of the efficient traffic infrastructure that would work into the European network;
- decentralisation of the economic system and public services;
- increase of the infrastructural access for the urban and rural settlements in the urban area;
- establishing the new housing policy and the policy of construction;
- increase of the cultural identity of the City (cultural and natural values);
- advancement and protection of the environment;
- increase of the economic efficiency and social cohesion in the City.

Polycentrism and decentralisation have been applied literally by division on 6 + 1 district (central urban municipalities at one district), i.e. meso-region within the administrative area (Stojkov B., Tošić B. 2003, 1 - 20). Today, therefore, the City of Belgrade has the planned support to the projects which can be proposed for the financial and organisational support at the European structural funds.

One specific characteristic distinguishes the Belgrade region from other towns in Serbia. The administrative system is centralised, one mayor of the whole area of the City (17 municipalities) and administration which makes decisions about major and other significant projects on one side, while on the other side, the urban municipalities are covered by a planned act (general plan), while 7 other peripheral municipalities have their own general plans and the administrative system which make them partially independent in relation to the City. Furthermore, some peripheral municipalities make their own spatial plans and thus organize the space of their own territory. In this way the equality of 10 central urban municipalities which do not have the right on it is endangered and their planning on partial organisation of some parts is reduced by the urban plans of lower rank which are adopted by the Assembly of the City. Therefore, the system of organizing and governing the City becomes the dominant issue, not only in the implementation of some planned acts, but in the essential relationship towards planning and strategic determinations, i.e. the relationship of the City and its administrative region (Šećerov V, 2007).

The basic aim of the development has been defined by the Regional Spatial Plan of the Belgrade Administrative Area – the organised activation of the regional spatial potentials of the Belgrade region, based on the principles of the sustainable development, by which its attractiveness would increase and the conditions for achieving the standards of the European metropolis would be ensured.

Figure 2: Territorial Development of Belgrade.



3. Physical-geographical factors relevant for the development of Ljubljana

Darko Ogrin

3.1. Natural transport openness at the contact of diverse landscape units

In view of large physical-geographical units that make up Slovenia, Ljubljana lies in the area of the sub-Alpine regions which, as a mountainous crescent, rim the Julian Alps, the Karavanke and the Kamnik-and-Savinja Alps. This crescent is not continuous; the large tectonic depression of the Ljubljana basin divides it into the Eastern- and the Western sub-Alpine mountain ranges. The Ljubljana basin is the largest continuous plain in Slovenia, 60 km long and 20 km wide. Its bottom rises in the SE – NW direction, from the initial 260 m to 550 m above sea level. The sinking of the basin began as early as the Oligocene (from 36 to 23 million years ago), when it was filled up by the sea pouring in from the eastern side, i.e. the Pannonian sea. The sinking continued in the Neogene. The last ice age (Pleistocene, from 1.6 million years to 10.000 B.C.) was particularly decisive for its present image, owing to the very intense weathering caused by great temperature oscillations. The rivers, the Sava in particular, accumulated large amounts of glacial material in that period, so that the layers of gravel and conglomerate are up to 100 m thick at some places.

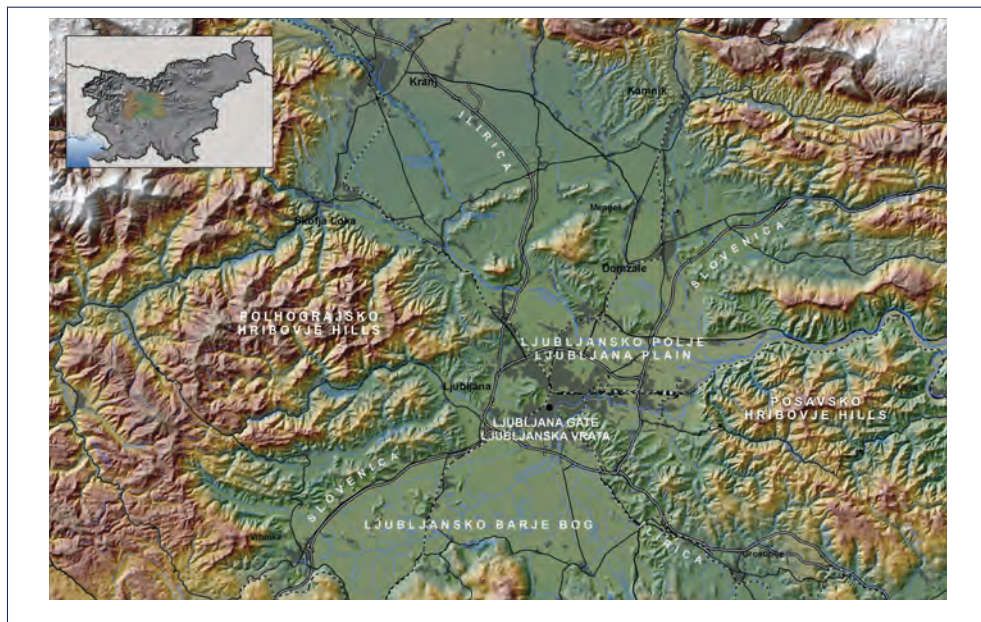
Ljubljana was founded in the southern part of the Ljubljana basin, at the contact of the Ljubljansko Polje plain (hereinafter: Ljubljansko Polje) and the Ljubljana Marsh (also Ljubljana Bog, hereinafter Ljubljansko Barje or just Barje), and at the transition of the Polhograjsko Hribovje hills to the Posavsko Hribovje hills. The Ljubljansko Barje is usually regarded as a part of the sub-Alpine regions, though its hydrological features strongly resemble the karst poljes, therefore in some physical-geographical divisions of Slovenia (e.g. Gabrovec et al., 1998) it is ranked among the Dinaric-karst regions which border its southern edge. Ljubljana developed along the 1.5 km wide Ljubljana gate (298 m a.s.l.), where the river Ljubljanica had broken through the low hilly barrier of carbonate schists between the hills Rožnik (394 m) and Šišenski Hrib (429 m) in the west and the hills Grad (366 m) and Golovec (450 m) in the east.

Due to the recent tectonic sinking which has been active in the eastern and southern parts of the basin all until the present, the Ljubljana basin became a confluence area of the powerful water streams which cut the hilly rim and made feasible the natural transport openness in all directions, except in the direction of the Karavanke. The valleys of the Črna and the Nevljica and the Črni Graben valley connect the Ljubljana basin with the Celje basin and the Upper Savinja valley. Along the Sava valley in the Posavsko Hribovje hills transport is possible towards Zagreb and Celje, and along the Dolenjsko Podolje system of valleys transport runs towards the Krško basin and the Croatian Posavina region. Through the Upper Sava valley the Ljubljana basin is connected with La Valcanale valley, and across

the saddles of less than 900 m a.s.l. roads run across the Škofjeloško Hribovje hills to the Soča region, and across the Postojna gate (609 m a.s.l.) towards the Adriatic sea.

Because of the favourable transport position between the Apennine Peninsula and the Donava drainage basin the antique settlement Emona, the predecessor of the present Ljubljana, developed on the prehistoric foundations in the southern part of the Ljubljana basin. In the later centuries, the favourable transport position made possible for Ljubljana to develop faster than other Slovenian towns. An intensified economic development began after the mid-19th century, when the railway line was constructed between Vienna and Trieste. This was also the time when Ljubljana became the political and cultural centre of the Slovenians. The southern part of the Ljubljana basin, i.e. Ljubljana, is also the crossing point of modern transport routes. The Illirica (the Sava route), running in the NW-SE direction, connects West- and Central Europe with South-East Europe, and the Slovenica, running in the NE-SW direction, connects the Mediterranean with East Europe. The Slovenica also makes part of the European transport corridor number V (Venice–Trieste–Ljubljana–Budapest), and the Illirica makes part of the corridor number X (Villach–Ljubljana–Zagreb–Belgrade).

Figure 3: Position of Ljubljana at the contact of major physical-geographical units and transport routes.



3.2. Rock structure and landforms as the factors of urban development

The antique settlement, Emona, developed on the southern edge of the present city centre, at the transition of the Ljubljansko Polje gravel accumulation to the Ljubljansko Barje soft sediments, while the Medieval Ljubljana developed under the hill Grad along the banks of the Ljubljanica. Both settlements mainly spread on rock basis of higher carrying capacity where the building process was less complicated. On the marshy Ljubljansko

Barje of lesser carrying capacity, the town began to spread more intensely only after the 2nd World War, because the building process on the marshy ground is more demanding and more expensive due to sanding and piling, in spite of the lower prices of building plots. The present town mainly extends over two level landscape units, the Ljubljansko Polje and the Ljubljansko Barje, which offer different conditions for urban development. The Ljubljansko Polje, where the northern part of the town lies, is not a monotonous plain, but is dissected by fluvial terraces which play an important role in the settling process and the agricultural use. It was formed by the river Sava through its accumulation and erosion processes, and is about 20 km long, up to 6 km wide, lying at the altitude between 265 and 320 m. It is situated between the Ljubljana gate and some isolated hills, i.e. Šmarna Gora (669 m a.s.l.), Rašica (631 m a.s.l.), Straški vrh (452 m a.s.l.) and Soteški Hrib (450 m a.s.l.), which demarcate the Ljubljansko Polje from the Skaručensko Polje plain, or the Kamniško-Bistriška Ravnina plain, and form a link between the Polhograjsko hribovje hills and the Posavsko hribovje hills.

The basis of the Ljubljansko Polje consists of firmly consolidated conglomerate which is covered with thick accumulations of mainly limy gravel. In the slightly inclined surface which drops from the NW towards the SE and the S, the Sava formed a series of terraces, and at some places it also eroded the pre-Quaternary bottom (e.g. at Tacen and the bridge at Črnuče). In the past times, the Sava frequently shifted its riverbed in the central part of the plane, made accumulations and eroded its own sediments and was a threat to agriculture, transport connections and the population. Its channel was straightened and made deeper with the regulation works and the transport capacity of the river thus increased. There is an extensive alluvial plane along the river, dissected into several terraces which are overgrown with pioneer and forest vegetation. The gravel terraces of older origin are mainly cleared, settled and transformed into fields, although their brown soil is shallow and gravelly.

Old agrarian villages emerged along the NE edge of the gravel terrace on the slope above the Sava plane on the right side of the Sava between Medno and Zalog (Vižmarje, Savlje, Ježica, Stožice, Tomačevo, Šmartno, Zadobrova) and on the left side between Tacen and Dolsko (Črnuče, Šentjakob, Brinje, Beričevo, Videm, Dol). Another series of villages developed at the foot of the hills between Medno and Sostro, where the brooks from the northern fringes of the Polhograjsko Hribovje hills and Golovec covered the gravel plain with clay (Stanežiče, Šentvid, Dravlje, Šiška, Štepanjska vas, Hrušica, Bizovik, Dobrunje). The numerous old settlements developed into suburban areas of Ljubljana, because the conditions for house building are more favourable here than on the neighbouring Ljubljansko Barje; thus the Ljubljansko Polje ranks among the most densely populated regions in Slovenia.

The Ljubljansko Polje is the most intense traffic area of the Ljubljana basin. The transport routes converge in the narrow area between Rožnik and Golovec (the Ljubljana gate) and form the centre of the so-called Slovenian transport cross. On the NE, Ljubljana has the transport linkage with the sub-Alpine route Graz – Maribor – Celje – Trojane, which continues along the northern edge of the Ljubljana Marsh towards the Postojna gate and the Mediterranean. The Sava valley allows transport openness towards the NW and slightly less so towards the SE, in which direction the railway line runs along the narrow valley. Important road connections towards the Krško valley run along the NE edge of the Barje and

cross the Dolenjsko Podolje system of valleys. The Ljubljansko Polje is also a very important source of drinking water, since its groundwater provides as much as 90 % of the water supply for Ljubljana (pumping stations: Šentvid, Kleče, Jarški prod and Hrastje). Even today the groundwater of the Ljubljansko Polje is regarded as a quality resource, although the results of analyses have already shown the increasing impact of environmental pollution (Brečko Grubar, 1999).

Figure 4:

Cross-section of gravel accumulations of the Ljubljansko Polje plain. The depth of gravel accumulations and deep water table make feasible the construction of several-storey basements.

Photo: D. Ogrin.



The southern section of Ljubljana (south of Aškerčeva cesta street) spreads to the Ljubljansko Barje. This is the southernmost and in terms of tectonics the youngest part of the Ljubljana basin. It comprises about 160 km² of the plain between the slopes of the southwesternmost part of the Posavsko hribovje hills to the east, the Polhograjsko hribovje hills to the north and northwest and the Dinaric plateaus with Mt. Krim (1108 m) and Mt. Mokrc (1059 m) to the south. The major part of the plain lies at the altitude between 288 and 290 m above sea level, and rising above it up to about 300 to 400 m a.s.l. are several isolated hills (Sinja Gorica, Blatna Brezovica, Bevke, Kostanjevica, Plešivca, Grič, isolated hills at Vnanje Gorice) which are the less sunken parts of the bottom of the Ljubljansko Barje. The isolated hills mainly consist of Triassic dolomite and to a lesser degree also of limestone, just like the bottom of the Barje basin and its southern and SW fringes.

The origin of the Ljubljana Marsh dates back to about 2 million years ago when the sinking began along the tectonic faults, which has been going on until today. This sinking was most intense during the ice age. The basin which appeared due to the sinking was currently filled by the streams, the Ljubljanica in particular, and when the sinking was faster than sedimentation, a lake emerged. The rate of the sinking was rather high, since in 500 years the bottom was lowered by 1 meter, and the present annual rate amounts to as much as 5 to 25 mm per year (Lovrenčak, Orožen Adamič, 1998). Due to the intense sinking of the Barje, the deposits of gravel, sands, clay and loam are very thick, reaching up to 100 m in its western half, and over 150 m in its eastern, deeper part. The composition of sediments in the Barje basin is rather heterogeneous. On the surface, there is up to 20 m thick layer of clay-silt sediments with remains of vegetation (peat), and at the edge of the Barje plain, also sand-clays and silt, and lying under all of these are sandy-gravel Pleistocene aquifer sediments, which are separated in two parts by impermeable clays. Clay-gravel sediments only occur on the surface of the alluvial fans of the Iška and the Gradaščica, while the allu-

vial fans of the Želimeljščica, the Škofeljščica and the Borovniščica rather rapidly sink under the impermeable boggy sediments (Mencej, 1990).

Times ago, the Ljubljansko Barje was the southernmost European raised bog (which also gave the name to the landscape: bog = barje) and the only case of the blanked bog in Slovenia. It was rich in peat which had originated from the accumulated dead marshy vegetation being anaerobically weathered and carbonized. In the 19th century the digging of peat and its economic use began in the Ljubljansko Barje, which continued until a few years after the end of the 2nd World War. The peat has mainly been exploited by now and is no longer allowed to be dug. Because of the regulation and drainage works of the Barje, it no longer grows while minor peat areas and living peat bogs have only been preserved near Bevke (Mali Plac), Črna Vas, Goričica and Grmez.

In comparison with the Ljubljansko Polje, the settling of the Barje is thinner and also of younger origin. Old villages emerged on the dryer margin of the marsh on the "compact soil" of better carrying capacity, where also the transport veins ran. In the central area of the Barje the first settlements occurred only in the 19th century (Črna vas, Lipe), after the boggy ground had become suitable for agriculture, partly at least, upon the long-lasting drainage works. Ljubljana did not spread to the Barje until the 1st World War; only after it, the first town quarters began to emerge here (Galjevica, Sibirija). However, despite the unfavourable conditions for building (piling) and poor furnishing with communal infrastructure, the Barje underwent an expansion of urbanization after the 2nd World War, when numerous illegal houses were also built (Rakova Jelša).

Figure 5:

Due to the poor carrying capacity of the surface, the building of houses on the Ljubljansko Barje requires the piling.

Photo: D. Ogrin.



3.3. Seismic hazard due to active recent tectonics

Typical of the southern part of the Ljubljana basin, including the Ljubljansko Barje, is active recent tectonics which results from the sinking of the Barje along numerous faults. Along the faults running in the Dinaric, i.e. NW–SE direction (in the area of the Barje these are: the Dobrepolje-, the Želimlje-, the Mišji Dol- and the Borovnica faults; Pavšič, 2008, 6), and those that run rectangularly to this direction (the Vič- and the Podpeč faults), and along the thrust structure running in the Alpine, east-west direction across the centre of the Barje numerous small and greater earthquakes continuously occur. The faults are mainly shallow (up to 10 km), therefore the epicentres also lie close to the surface. Although in general

the earthquakes in our country are not of higher magnitude values, their effects might be quite serious due to shallow epicentres (Vidrih 2002).

According to the official map on seismic hazard in Slovenia for the recurrent earthquake period of 500 years (Ribarič, 1987), the anticipated intensity of earthquakes in Ljubljana and its surroundings could be of degree VIII acc. to the EMS, which means building collapse earthquakes. In the recent years a new, modern map on seismic hazard was made (Lapajne et al., 2001) showing the calculated design ground acceleration and flexibility spectres of response for diverse types of ground instead of the maximum intensity of earthquakes. According to this map, too, the area of Ljubljana, together with the Upper Soča region, ranks among the areas of the greatest earthquake risk in Slovenia. As the maps of Intensities and magnitudes of earthquakes in Slovenia from 567 A.D. onwards (Vidrih, 2008, 53) show, at least two earthquakes with the intensity of VIII-IX, or IX degree with the magnitude above 6, and five earthquakes with the intensity of VII-VIII or VIII degree with the magnitude 5.1 to 6.0, have struck the wider area of Ljubljana in addition to numerous earthquakes of minor intensities.

Of all the earthquakes in Ljubljana, the one of 1895 marked a real turning point. The results were not only negative, but also positive. Parallel to urbanistic and architectural restoration of the town, an investigation into the building-technical standards was also made, which provided the first guidelines for the seismic-safe building techniques. Two years after the earthquake, a seismic observation post started to operate in Ljubljana, the first one in the Austro-Hungarian monarchy. The Ljubljana earthquake of 1895 had the magnitude of 6.1, the epicentre was in the depth of 16 km, and its effects were the most intense – between VIII and IX degrees acc. to the EMS – in the town area, on the Ljubljansko Barje and up to Vodice in the north. The earthquake caused enormous material damage; about 10 % of the buildings were damaged which were mainly pulled down later on. Under the ruins, seven people died in Ljubljana and three at Vodice (Vidrih, 2008).

Since the Ljubljana area belongs to the areas with the highest seismic hazard in Slovenia, a microseismic regionalization was made for it (Figure 5). According to this regionalization, almost half of the territory of the Ljubljana municipality is relatively safe from earthquake. This is mainly the hilly area in the east of the municipality and the northern part of the town lying on the higher terraces of the Ljubljansko Polje. Falling within the medium earthquake risk is more than a third of the municipality (lower terraces along the Sava and the Ljubljana). The area of the greatest hazard (degree IX earthquakes) is the Ljubljansko Barje and its transition to the Ljubljansko Polje in the Ljubljana gate, where the city centre also lies. This area occupies about 15 % of the municipality where almost 10 % of the inhabitants live (Orožen Adamič, Hrvatin, 2000).

3.4. Flood hazard and water resources

Ljubljana is closely related to the Ljubljana, the river which springs from numerous karst sources near Vrhnika and has an extensive karstic and non-karstic drainage basin. Typical of it and its numerous tributaries on the Barje (the Ljubija, the Bistra, the Borovniščica, the Iška, the Ižica, the Gradaščica, the Mali Graben) is a very small vertical drop, lesser than 2 ‰, which has a strong impact on the drainage conditions and flood occurrence on the

Ljubljansko Barje and in the south parts of the town. Important for flood occurrence are also explicit seasonal oscillations. The lowest discharges are lesser than 10 m³/s (late summer), while the extreme discharges exceed 300 m³/s (usually in autumn at precipitation extremes). On the northern side, the town has spread all to the Sava and beyond it. The hydrological regime of the Sava differs from that of the Ljubljanica, and they have separate flood areas. Prior to the regulation works at the beginning of the 20th century, extensive flood areas extended along the Sava, with numerous meanders, oxbow lakes and groves. After the flow had been regulated and the channel straightened, the riverbed deepened and flood occurrence reduced. The built-up areas and transport infrastructure began to spread over the onetime riverine belt; in spite of it being so, these areas are less endangered by floods than the southern part of Ljubljana. Fortunately, also the causes of floods by the Sava and of those on the Barje are different, so – as a rule – Ljubljana does not face concurrent floods on both of these areas.

Throughout the history Ljubljana has had to cope with floods in the town and on the Barje. Extensive drainage works were started on the Barje as early as the end of the 18th and the beginning of the 19th century. In order to reduce flood hazard in the very town, the relieving Gruberjev Prekop channel was dug between Grad and Golovec hills in the years 1772 – 1782. It cut through the Ljubljanica meander around Grad hill, and the runoff capacity at high waters was increased. In spite of extensive drainage works on the Barje (the total length of drainage ditches amounts to over 600 km), the Barje can still be flooded periodically. Exposed to flood hazard is also the southern part of the town, which is intensely spreading into the area of flood risk, because the technical solutions are overestimated while the flood risk is underestimated. The latest big flood (of which no accurate data have yet been available in time of preparation of this book) occurred in September 2010. It resulted from extremely heavy rains, when more than 200 mm of precipitation fell in the central part of Slovenia within a spell of three days only. Floods occurred in numerous parts of Slovenia and caused extensive material damage. In the Ljubljana area, the greatest damage occurred in the SW and S parts of the city (along the rivers of Gradaščica, Mali Graben, Ljubljanica and Ižica) and in the Ljubljansko Barje moor area. Big flood occurred also in October 1994 along the Mali Graben, a tributary to the Ljubljanica, when more than 100 family houses of mainly recent origin were flooded (Starec, 1996). In the case of disastrous floods in the Ljubljanica drainage basin, which – as a rule – are caused by exceptional rain showers when more than 300 mm (or even less, as in the aforementioned example from September 2010) of precipitation falls in a single day, 2500 to 3000 hectares of urban areas in the southern part of Ljubljana (6 % of the inhabitants, 11 % of the buildings) are exposed to flood hazard, which is the largest endangered urban area in Slovenia (Orožen Adamič, Hrvatin, 2000). Such a disaster affected Ljubljana in the year 1926.

Floods on the Ljubljansko Barje, which also used to endanger Ljubljana in the past, are most frequent in autumn and winter; they last up to 5 days, cover about 15 % of the area, and at high inflows even up to half of the Barje. They are mainly caused by the limited runoff from the Barje, which amounts to about 600 m³/s, while the inflow during the powerful precipitation amounts to almost 800 m³/s. In such cases the swollen Gradaščica with the Horjulščica and the Ižica block the draining of the Ljubljanica from the Barje, thus causing the flood (Kolbezen, 1985).

Figure 6:
Floods at Lipe on the
Ljubljansko Barje.

Photo: D. Ogrin.



The Ljubljanica is a moderately polluted river, which is mainly the consequence of large amounts of insufficiently purified waste waters discharged into it, and only partly the consequence of its modest self-purifying capacities due to its low vertical drop (Brečko, 1999). Fortunately, it runs on the impermeable sediments of the Ljubljansko Barje, thus having no hydrological connection with the groundwater. Ljubljana needs large quantities of drinking water, so the groundwater of the Ljubljansko Barje remains an important source of it. To protect this water resource as well as the groundwater of the Ljubljansko Polje, which is the key resource for the supply of Ljubljana, is an important strategic objective, since quantitatively rich water resources represent an important factor of development.

Owing to its geological history, the Ljubljansko Barje is a complex aquifer system consisting of a larger number of intragranular and fissure aquifers. It is very important from the viewpoint of the water supply of Ljubljana that these aquifers are very permeable and rich in water. The investigations performed so far have shown that individual aquifers are hydraulically interconnected, and most of the groundwater that is close to the surface results from the direct infiltration of precipitation water, while in deeper parts the groundwater is resupplied with the water from the hills that surround the Barje. It is anticipated that the possible intensified pumping of groundwater from the deeper parts of the aquifer could also affect the water quantity in the shallower parts of the aquifer, which would consequently reduce water quantities in the upper sections of the aquifer system. The final result could be that the already considerable sinking of the Barje surface might further increase (Brenčič, 2008). This threat is one of the restricting factors to exploiting the groundwater of the Ljubljansko Barje for the needs of water supply of Ljubljana.

For the time being, the aquifer of the Ljubljansko Barje is only exploited by the water-pumping station Brest, which supplies water to the southern part of Ljubljana. This station pumps water from the shallow Holocene aquifer of the Iška alluvial fan and from the lower deep Pleistocene aquifer (Brenčič, 2008). The water-pumping station Brest supplies about 10 % of the water used in Ljubljana, and the remaining 90 % are provided by the pumping stations on the Ljubljansko Polje (Hrastje, Kleče, Jarški prod, Šentvid). Because of the proximity of settlements where the communal sewage system is not organized, the water from the pumping station Brest must be chlorinated, which is not necessary for the water from the pumping stations on the Ljubljansko Polje, though its aquifer lies – to a larger extent – under the urbanised areas of Ljubljana. The groundwater of the Ljubljansko Polje occurs

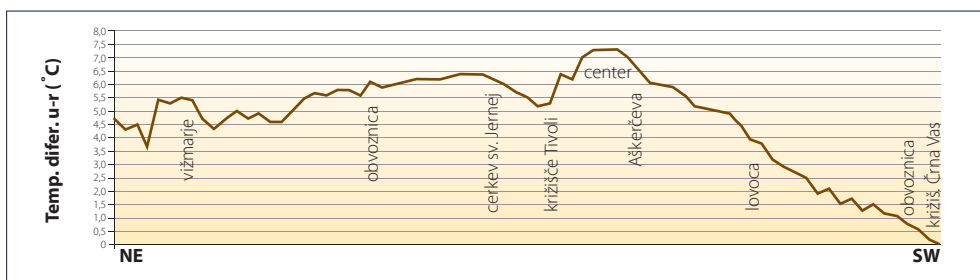
in gravel-sand and conglomerate layers that are up to 100 m thick and the water table runs mainly at 15 to 25 m under the surface; about one half of the dynamic reserves are mainly restored through the infiltration of the Sava water. As to the geological and hydro-geological features of the Ljubljansko Polje, its groundwater is rather well protected, but the soil-based protection is rather poor, because shallow and light soils prevail which are well-permeable for water and enable fast percolation of water into the aquifer. Investigations have shown that the groundwater of the Ljubljansko Polje is sensitive to chemical pollution in particular, since the precipitation water, with no larger surface runoff, infiltrates through the lithologically diverse unprotected zone into a rather shallow water table, thus becoming, in addition to the surface water of the Sava, a powerful medium of spreading pollutants from the heavily polluted surface into the groundwater (Bračič Železnik et al., 2005). This fact is also evident from the pollution with metals, nitrates, pesticides and organic solvents, which has still been within the permitted limits in most of the cases (Plut, 2007).

3.5. Urban climate and the quality of air

Ljubljana as a medium-size town has quite explicit features of urban climate, typical of which are: the urban heat island, lower relative air humidity, poorer windiness and more heavily polluted air. So it proves to be a relevant factor which should be taken into consideration in the subsequent development of the town and the implementation of town-planning steps. Some negative features of urban climate are further intensified by the location in the basin, which hinders aeration and causes frequent temperature inversions which are mainly accompanied by fog and low cloudiness in the cold season. The main characteristics of the urban climate of Ljubljana that are presented in the following paragraphs were taken from the study *Mestna klima Ljubljane* (The Urban Climate of Ljubljana) (Jernej, 2000).

The study shows that Ljubljana has a stable single-cell urban heat island. In stable anticyclonic weather when the urban heat island is most explicitly developed, temperature differences between the centre and the fringes in the first half of the night amount to 4 to 6 degrees. In winter, when the surrounding areas are covered with snow, while it is removed from the town, and when slightly later fog occurs, these differences can increase up to 10 degrees. The coldest is the Barje part of the town. The intensity of the heat island depends greatly on the density of the building up. The highest temperatures occur between the Aškerčeva street and the railway station and between the Grad hill and the Šišenski Hrib hill, where the density of the buildings is evenly balanced (Figure 7).

Figure 7: Temperature differences in Ljubljana along the profile from Vižmarje to Črna Vas on the Ljubljansko Barje (26 December 1998; 23:00).



Source: Jernej, 2000.

Ground inversions prevail in the town centre at night. The inversion air layer is between 200 and 400 m thick, therefore the hilly fringe of the town reaches above the inversion air layer. The percentage of ground inversions is slightly lower in winter, while the percentage of elevated inversions, into which the ground inversions are transformed due to the urban heat island, increases. The elevated inversions prevail in daytime. Important from the viewpoint of air pollution is the fact that the transformation of ground fog into elevated fog, due to the anthropogenous input of heat and the mixing of ground air layer, first takes place in the town centre, while in winter, for example, ground fog on the Ljubljansko Barje remains throughout the day. This means that the possibilities for attenuation of polluted air above Ljubljana are very limited (the mixing layer is from 200 to 300 m thick), which is especially problematic when the inversion weather type lasts for a longer span of time. In such a case, the pollution of air intensifies from day to day.

In anticyclonic type of weather the closed basin position of Ljubljana intensifies the development of local winds. The local air circulation is weak but important as regards air pollution which is most intense in such weather. Temperature differences resulting from the urban heat island cause a slight convergence of air from the surroundings towards the town centre during the night. A certain role in these flows is also played by pressure and temperature differences between the Ljubljansko Barje and the Sava valley along which the cold air converges. These air flows from the surroundings convey fresh air, unburdened with pollutants, into the town centre at the ground; it rises above the centre and, at the height of a little more than 100 m, flows as the reverse flow back to the town fringes. This system of centripetal flows should be taken into consideration in urbanistic regulations and the planning of urban activities, thus providing the aeration of the town along the green corridors (along the Ljubljana, between Dunajska cesta and Šmartinska cesta streets, along Zaloška cesta street), since one of the typical features of the climate in Ljubljana is a rather high burdening of air with harmful substances in winter due to the basin position, poor aeration, and high percentage of inversions which occur in more than 60 % of all weather situations.

4. Physical-geographic factors of development of Belgrade

Danijela Obradović-Arsić, Dejan Filipović

Physical-geographic factors determine the basic directions of the development of the city. They, on one side, enable the spatial development of the city, offering favourable conditions for space usage, construction and life of citizens (favourable terrain slopes and expositions of slopes, enough drinking water and technical-technological waters, favourable climate conditions, etc.), while on the other side, they can represent the obstacle/limitation for the further development of the city (rockslides, landslides, floods, earthquakes, etc.), which is sometimes impossible to overcome or the exceeding of the obstacles demands large financial investments.

The physical-geographic identity of Belgrade is based on the connection of its different natural wholes, i.e. the position on the Šumadija, Srem and Banat side, as well as in the Posavina and Podunavlje belt.

The administratively established border of the City of Belgrade (17 Belgrade municipalities) does not coincide with its natural borders, mostly due to different terrain configuration. The natural borders of the City of Belgrade are approximately corresponding to its metropolitan area which is located on the edged area of two large, completely different natural wholes: the Pannonian Plain and the Balkan Peninsula.

The natural conditions mean the complex of influences of different elements of the natural environment (relief, climate, waters and type of vegetation) and man, defining its basic characteristics, but also different aspects of the area usage. Good knowledge of all natural conditions is necessary for understanding the contemporary processes in the natural environment of Belgrade, with the aim of regular and rational approach in the use of the natural potentials. Therefore, it is necessary to make a regular analysis of the physical-geographic conditions and to establish all the potentials and limitations as the basis of the optimal purpose of a certain territory and its spatial development.

4.1. Geographic position

The natural position of Belgrade is unique in Europe. The city is located at the confluence of two large rivers-the Sava and the Danube and in the contact zone of the southern ridge of the Pannonian basin and the northern border of the Balkan Peninsula.

Geographical position of Belgrade is defined by the following coordinates: 44° 49' 14" of Northern latitude and 20° 27' 44" of Eastern longitude (coordinates in Knez Mihailo Street). Actually, Belgrade extends from the utmost point in the north (45° 06' of Northern latitude, 20° 23' of Eastern longitude) - Palilula, to the utmost point in the south (44° 16' of Northern latitude, 20° 18' of Eastern longitude) - Lazarevac, and from the utmost

point in the east (44° 27' of Northern latitude, 20° 52' of Eastern longitude) - Mladenovac, to the utmost western point (44° 38' of Northern latitude and 19° 59' of Eastern longitude) - Obrenovac.

The average altitude of Belgrade is 132 m and it is presented by the altitude of the Meteorological Observatory (44° 48' of Northern latitude and 20° 28' of Eastern longitude). The lowest point is 71 m above the sea-level (Grocka), while the highest is 628 m (Kosmaj).

The highest peak elevation of Belgrade in the inner urban area is on Torlak (Voždovac) – St. Trinity Church 303.1 m, while Ada Huja has the lowest one of 70.15 m.

4.2. Relief

The relief of Belgrade is in the morphological and genetic sense very complex, so that different forms of the relief intersect on relatively small area: tectonic, fluvial, abrasion, karst and eolian.

In the morphologic-tectonic respect, the area of the city of Belgrade belongs to two large wholes: the Pannonian Plain in the north and hilly terrains of central Serbia (Šumadija) in the south. In the relief of the Šumadija hilly terrain, two mountains stand out: Avala (511 m) and Kosmaj (628 m). The terrain descends gradually from south towards north, divided by the valleys of small rivers and brooks. South from the Sava and the Danube, the relief is characterised by great plasticity, so that the city extends over many hills (Banovo, Lekino, Topčidersko, Julino, Petlovo, etc.), while alluvial flats and loess plateaus stretch north from the Sava and the Danube.

The Pannonian basin includes the parts of the Sava, the Danube and the Pannonian Plain. The Danube entrenched its valley in marine-lake sediments of the Pannonian basin bottom, lowered along large faults and inclined towards south. The Danube valley is asymmetrical; the escarpment even 100 m high is on the right side, moved towards the south by lateral erosion. The alluvial flat of the recent bottom of the Pannonian basin is on the left side. The Sava entrenched its valley along the north-south fault line. The fault scarp is moved and changed by lateral erosion. The absolute height of the Danube alluvial flat is 68 - 74 m, while the lowest river terrace 2 - 6 m high is above it. The alluvial flat of the Sava is narrower and there are not alluvial terraces on it. The highest heights of the Pannonian Belgrade are in Surčin (104 m) and on the loess plateau of Zemun (84 m).

The Šumadija territory of Belgrade was built of fluvial-denudation plateaus, lined up sloping, the altitude of which decreases towards the north. These are: Ripanj (310 - 330 m), Pinosava (210 - 240) and Belgrade (120 - 140 m) with two stages: Terazije (125 m) and Bulbuder (80 m) (Petrovic D., Manojlović P., 2004). The most known relief forms of the Šumadija hilly terrain are Kosmaj (628 m) and Avala (511 m) which belong to the meridional expansion of limestone reef of Šumadija.

The river basin and the valley of the Topčiderska River are morphologically very interesting (the whole basin is entrenched into the Šumadija reef), as well as the epigenetic gorge of the Bolečica river which flows north from Avala and empties into the Danube near Vinča.

The territory of Belgrade also includes the parts of the river basins of the lower Kolubara, Peštan, Rajla and Veliki Lug.

The limestone terrain appears in the surroundings of Belgrade, around Žarkovo, Železnik, Sremčica, Guncat, Lisović and Manić. It is the so-called Belgrade merokarst, characterised by dolines, dry valleys, smaller abysses and caves.

4.3. Climate characteristics

The territory of the City of Belgrade is located in the area of temperate-continental climate with local varieties. The mean annual air temperature is 11.7 °C, but the temperature changes from year to year due to anthropogenic influences of the urban area, as well as due to global warming.

February is the coldest month with the mean temperature of 0.0 °C, while July is the warmest month with the mean temperature of 22.1 °C. The amplitude of the absolute maximum and minimum temperature is 68 °C, which points to the continentality of Belgrade climate.

All four seasons prevail. Autumn is longer than spring, with longer sunny intervals. In winter, the average number of days with temperatures below 0 °C is 21. Spring is short and rainy. The average number of days with temperatures higher than 30 °C is 31 °C.

The lowest temperature ever measured in Belgrade is - 26.2 °C (January 10th 1893). The highest measured temperature is of August 12th 1921 and September 9th of 1946 - it was 41.8 °C. In the period from 1888 to 1995, only six days with the temperatures over 40 °C were registered.

The average annual precipitation amount is 666.9 mm. Most rains come during the months when it is mainly needed for vegetation (in May and June). Hence, the conditions for the development of fauna and flora are favourable. June is the month with the highest precipitation (the average of 86.6 mm). The average number of snowy days is 27, while the number of days with snow lying on the ground ranges from 30 to 44 days, with the depth of the snow from 14 to 25 cm.

The average annual relative air humidity is 69.5 %. July is the month of the least moisture (mean relative humidity is 62.7 %), while December has the highest humidity (81 %).

The average annual number of clear days is 67, while the number of cloudy ones is 111.

The mean atmospheric pressure in Belgrade is 1001 mb. The highest atmospheric pressure was 1003.8 mb in 1921, while the lowest was 998.5 mb in 1915.

The greatest insolation of about 10 hours per day is in July and August, whereas December and January are the cloudiest months, when the sun shines only two hours.

The characteristic of Belgrade climate is *košava*, the south-eastern and eastern wind, which blows in autumn and winter, bringing clear and dry weather. It mostly blows 2-3 days. This wind has the significant role in cleaning the air in Belgrade. The western and north-western winds also blow throughout the year.

The mean annual insolation and the dominant air-streaming, point to the possibility of using the solar and eolian energies in the future, i.e. the economic and ecologic significance of these potentials.

4.4. Surface and underground waters

4.4.1. Surface waters

The territory of the City of Belgrade is characterised by very low quantities of water originated on its own area (domicile waters). The greatest part of the territory is in the zone where the specific runoff is about 1 – 2 l/s - km², which, according to the indexes of domicile waters, makes it one of the most lacking areas of the Republic of Serbia. The transit waters of the Danube and the Sava rivers are very significant resource with average annual balance of over 210 milliards m³.

The Danube flows through Belgrade in a length of 60 km. The width of the river is between 450 and 1200 m under the mean water level, while the depth is from 4.6 to 9.5 m. The left bank of the Danube is low, plain, swampy, while the right bank is with the loess escarpment of the Zemun loess plateau. The highest water levels are in April, whereas the lowest ones are in September. The average annual discharge of the Danube near Zemun is about 3000 m³/s and the temperature of water is 11.5 °C.

Figure 8: Confluence of Danube and Sava river (with protected island „Veliko ratno ostrvo“).



Photo: N. Čović.

The Sava flows through Belgrade in a length of 30 km and it joins the Danube below Kalemegdan, on 68 m above the sea-level. The Sava is from 230 to 600 m wide and 3 - 20 m deep. The highest mean monthly water level is in April, whereas the lowest one is in September. The average annual discharge of the Sava near Belgrade is 1172 m³/s and the temperature of water is 13.1 °C.

Even though Belgrade lies on two large rivers, it does not descend completely at the river banks. The length of the river banks of Belgrade is 200 km. The area of the Sava and the Danube in the Belgrade settlement is 22.25 km², while the area of the river islands is 5.41 km². Within the area of the City of Belgrade, there are 16 river islands on the Sava and the Danube, whereof the most famous are Ada Ciganlija, Veliko ratno ostrvo and Gročanska ada.

Figure 9:

Sava river with its two islands – Ada Ciganlija (right) and Ada Medjica (left).

Photo: N. Čović.



Besides the two most significant rivers, the Danube and the Sava, many other smaller rivers flow through the territory of the City of Belgrade, among which the following ones stand out: the Kolubara, the Topčiderska river, the Železnička river, the Barička river, the Veliki Lug, the Relja, the Bolečica, the Gračanska river, the Lukovica, Peštan, the Turija, the Beljanica, and the canals are the following: the Gealovica, the Sibnica, the Kalovita and the Vizelj.

Table 1: Basic hydrological data on rivers in Belgrade zone and relevant hydrological surroundings.

River	Gauging station	Area of drainage basin (km ²)	Average discharge (m ³ /s)	Q _{min,95%} (m ³ /s)	Q _{max,1%} (m ³ /s)
Danube	Pančevo	525.009	5222.00	/	/
Sava	Sremska Mitrovica	87.966	1532.00	285.4	6408
Tisa	Novi Bečej	145.415	766.00	122.6	3867
Tamiš	Tomaševac	9717	46.40	/	/
Kolubara	Draževac	3588	20.80	1.4	/
Kolubara	Beli Brod	1869	16.10	1.33	540
Veliki Lug	Mladenovac	122	0.38	0.02	55110 (0,1%)
Ub	Ub	214	1.01	0.005	/
Ljig	Bogovađa	679	4.70	0.10	/
Paljuvi Viš	Kladnica	74	0.26	/	/
Tamnava	Koceljeva	209	1.09	0.006	120200 (0,1%)
Onjeg	Brana	22	0.16	/	(0,1%) 95
Peštan	Zaoke	125	0.73	0.031	/

Source: Regional spatial plan of administrative area of Belgrade, 2004.

The systems of small waters are especially significant for planning the usage of surface waters. They are extremely unfavourable on all internal streams. It is particularly important to examine the systems of small waters on the Kolubara River in a zone of the mouth of the Peštan River because the industrial plants within the PD mining basin "Kolubara" use water from the Kolubara for technological needs.

The unevenness of discharge on all rivers, also including the Sava and the Danube, has been the unfavourable fact in regard of the exploitation of Belgrade springs, and especially in regard of work of the up-stream power stations in Obrenovac that operate with open cooling systems, due to which it comes to warming of the Sava, especially during the periods of low water levels. With an aim of protecting the water purification plants and the protection from eutrophication of the aquatorium in the zone of the City, it is necessary to define the concrete measures for diminishing the consequences of this phenomenon by a special project.

The Savsko Lake - On the Sava River, in the immediate vicinity of its confluence into the Danube, only four kilometres from the centre of Belgrade, the former island and the present-day peninsula of Ada Ciganlija is situated. The Sava flows on the northern side of Ada Ciganlija, while the lake (80 ha) and the Čukarički branch (16 ha) are on the southern side. The lower and upper dams on the branch of the Sava were built in 1967, so that Belgrade got a unique lake 4.2 km long with average width of 200 m, depth from 6 to 10 m and with 3 million cubic meters of water. The lake is named popularly "the Belgrade sea", because even about 300.000 visitors are swimming in it during the season. The total area of the centre of Ada Ciganlija with Ada Medjica and the aquatorium is 800 ha. The lake is intended for two specific purposes - it is suitable for mass recreation and all water sports, but moreover, it plays an important role in the water supplying (the inner zone of the protection of Belgrade water source), so its protection is of considerable significance.

Figure 10:

River Sava – island Ada Ciganlija and lake – recreation center.

Photo: N. Čović.



Besides the Savsko Lake, the accumulations near Avala are of the significance for the territory of the City of Belgrade, the main function of which is to keep the flooding wave, while their waters have rarely been used for watering agricultural crops and recreation. The accumulations are the following: Pariguz at Resnik, Bela reka at Ripanj and Duboki potok at Barajevo.

4.4.2. Underground waters and capacity of Belgrade springs

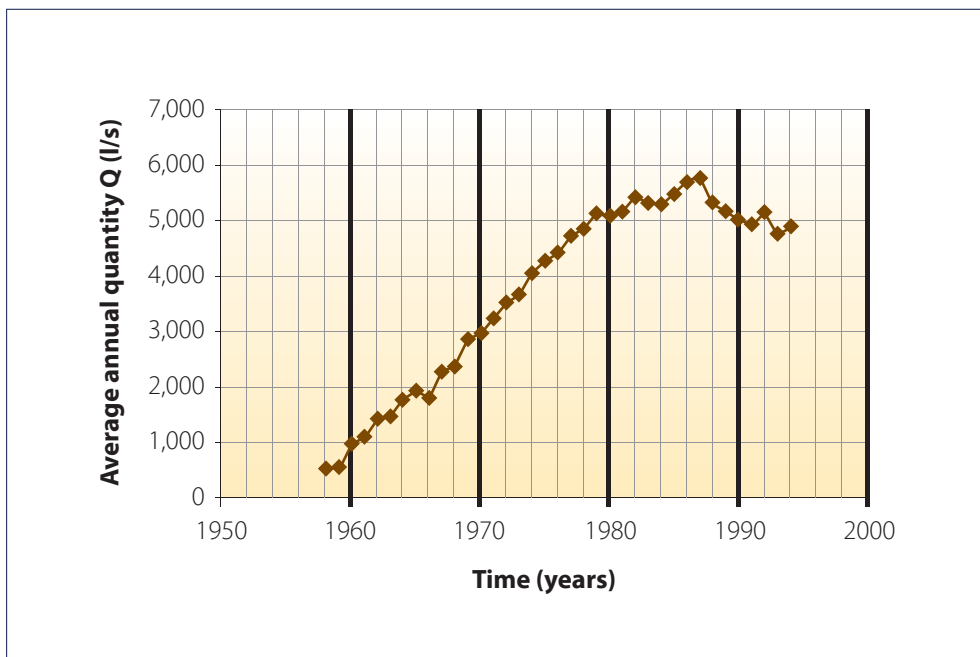
Underground waters represent valuable resource, but they are very unevenly arranged. The zones along both banks of the Sava and partly the Danube represent valuable springs of underground waters, the system of protection of which should be strengthened.

The available quantity of water which is used for water supplying of the City is limited by the capacity of activated springs and the capacity of the water purification plants.

The problem of the capacity of Belgrade water spring is very complex and it requires various and detailed researches. The capacity of springs means the quantity of underground water which can be obtained under the existing condition of wells. On the other side, the capacity of resources represents the maximum possible exploitation of water on the spring, under the supposition that the existing wells are put into ideal condition, i.e. that they are all in function.

In the case of Belgrade spring, the capacity of springs is far lower than the capacity of resources which is partly the consequence of an inadequate estimation of the capacity of resources. That brought to the exaggerated exploitation of underground waters and the decline of their level. Its exploitation increased from year to year. It was the highest in the 1980s. In 1982, it was 5300 l/s on the average, while in 1987 it reached its maximum with the average of 5700 l/s. From that period, the exploitation decreased which was attributed, among others, to putting the purification plant PS "Makiš I" into operation. In 2003 the exploitation was 5123 l/s and in 2007 the capacity was reduced to 4048 l/s.

Figure 11: Average annual quantity of underground waters obtained by wells of Belgrade spring.



Source: Belgrade Waterworks, 2003 (www.bvk.rs).

Table 2: Wells of Belgrade spring and their capacities in 2003.

Number of zone	Zone	Number of wells	Q _{uk} (l/s)	Q _{pros} (l/s)
1	New Belgrade	15	1067	71,13
2	Bežanijsko polje	16	957	59,81
3	Jakovačko polje	4	154	38,50
4	Boljevačko polje	8	389	48,63
5	Progarsko polje	17	893	52,53
6	Ada Ciganlija	21	833	39,66
7	Makiško polje	19	830	43,68
	TOTAL	100	5123	51,23

Source: Belgrade Waterworks, 2003 (www.bvk.rs).

Today, the spring of Belgrade water supply is dominantly connected with the Sava River. It is supplied by crude water from the underground spring at the foreshore, as well as by the direct catchment from the Sava and partly from the Danube.

During 2007, the underground water was obtained from 99 wells with horizontal channels. The proportion of catchment of underground water and river water was 57.83 % to 42.17 %.

Table 3: Total quantity of produced water and the capacity of Belgrade water spring.

	Produced water (m ³)	l/s	%
Underground water	127.665.550	4048	57.83
River water	93.097.343	2952	42.17
Total	220.762.893	7000	100

Source: Environment in the City of Belgrade, 2008.

In accordance with the City's needs for water, in 2007, 220.762.893 m³ of water were produced on the installations of Belgrade Water Supply (7000 l/s on average, whereof 4048 l/s of underground water).

From the period when the Belgrade spring was opened up to present day, the situation in the field of water supplying changed to a great extent. The number of residents and consumers increased, wells and equipment got old, while the capacity of spring declined². Consequently, the projects of expanding the existing springs have been considered for years, i.e. the project of the construction of new springs.

² At the beginning of the exploitation, the copiousness of wells was around 200 l/s, while 10-15 years later it decreased on 1/4 or 1/5. Such situation was the consequence of the decline of the level of underground waters due to a long-range operation of wells on the foreshore, i.e. the weakening of the hydraulic connection between the river and the surrounding on one side, and on the other side, old wells and ruined channels (of the previous 792 channels, 610 or 73 % were in function in 2003).

Among the projects of expanding the existing capacities, the project of expanding the springs in the part of Ušće has been emphasized, as well as the project of the construction of the infiltrating spring in Makiško polje, while the following springs have been taken into consideration as the potential water springs: the spring of Zidine (upstream from the Ostružnica bridge in meander of the Sava – left bank), Hrtkovačka draga (the left bank of the Sava, downstream from the Hrtkovci settlement, planned as a part of the water supplying system of "Istočni Srem"), the water spring of Jabučki Rit (the left bank of the Danube, near Jabučki rit, i.e. with the potential locations near Besni Fok, Crvenka and Gradska šuma – downstream from Pančevo; planned as water spring of the Banat part of the City) and the spring of Kovin-Dubovac (also on the left bank of the Danube, at the alluvial plateau between the settlements of Kovin and Dubovac).

4.5. Bio-geographic characteristics

The area of the city of Belgrade in bio-geographic view, represents the part of the Hol-arctic bio-geographic area: (a) middle European region of plain and hilly deciduous forests with corresponding derivatives of herbaceous vegetation including even nine forest ecosystems: forest of oak pomegranates and cerris, forest of English oak and barberry, forest of silver linden and oaks, forest of English oak and broom, forest of poplars and willows, forest of sessile oak and hornbeams, forest of English oak and hornbeams, montane forests of beech, forest of sessile oak and (b) Pontine-South Siberian region with the characteristic ecosystem of steppes and forest-steppes which is prevailing on the loess plateaus and hills along the Danube.

Except the ecosystem diversity, the diversity of flora and fauna represents the developmental advantage in relation to other large cities in the central and Western Europe.

Due many anthropogenic influences, the natural ecosystems/ areas were considerably modified in the past, so that today the urban, suburban and cultivated area has prevailed.

In regard of the preservation of authentic biodiversity, the work on the conservation of nature's values is of great significance. According to data of the Central Register of protected nature's values (2008), 46 nature's values are protected on the territory of Belgrade:

- three areas of extraordinary characteristics: Veliko ratno ostrvo, Kosmaj and Avala;
- 43 natural monuments (of botanical or geological value), are categorised as nature's values of great significance or significant nature's values.

With an aim of the natural ecosystem preservation of the City of Belgrade, besides the conservation of nature's values, attention should also be paid to autochthonous ecosystems, first of all to characteristic and relatively well preserved forest ecosystems on Avala, Košutnjak, Guberevačke forests, but also in the navigable zone of the Danube, in forelands and islands.

Table 4: Autonomous ecosystems (natural and artificial).

Autonomous ecosystems	Situation	Sensibility
Forests of hilly area (Avala, Kosmaj, Košutnjak, Lipovica)	unequal	Large dependence on strength of anthropogenic influences
Flooding forests by rivers (by levee of Danube, Veliko Ratno ostrvo, peak of Ada Huja)	Very unequal	temperate, due to great power of edificators
Forests, artificially raised (Banjička, Zvezdarska, Jajinska, Medaković, Šumice)	Very different	Larger than at natural
Swampy ecosystems (Veliko Ratno ostrvo, islands near Veliko Selo, Kozara)	unfavourable, caused by eutrophication	Temperate to large, depending on biotical capacity and anthropogenic influence
Artificial lake and swampy ecosystems (Ada Ciganlija, bay of Ada Huja)	Temperate favourable	large, if limiting capacities are exceeded
River system of the Sava and the Danube	unfavourable	large to temperate dependence on degree of pollution and power of self-purification
Segetal ecosystems (deserted agricultural areas)	Very different	Not important, reactivating or changing into green areas
Ruderal ecosystems (deserted urban areas)	very different	small, if left to natural processes

Source: Regional spatial plan of administrative area of Belgrade, 2004.

Protection, spatial distribution and development of the City of Belgrade have opened the key issue on understanding the borders of the present and future exhaustion of natural (autonomous) and agricultural (semi-autonomous) ecosystems of this area, being very often justified by the development and expansion of the city, but reduced to more and more intensive change of autonomous and semi-autonomous ecosystems into urban (non autonomous) ecosystems.

The problem of permanent expansion of Belgrade imposes finding the solution to the problem of preservation of biodiversity and urban surroundings. Therefore, the basic aim is to ensure the future development based on harmful influence on nature as little as possible, by which the degree of its non autonomy will also be lessened. That means the preservation of: (a) natural autonomous ecosystems in the surrounding; (b) maintenance and creation of semi-autonomous ecosystems in the inner urban area in the form of green areas of different size and purpose and (c) maintenance of semi-autonomous agro-ecosystems by the use of the contemporary measures in agriculture, based on the preservation of biological diversity of such ecosystems.

4.6. Minerals

Relatively diverse and economically very significant mineral wealth has been concentrated on the territory of the city of Belgrade. The lignite reserves in the mining basin of Kolubara are the most valuable. A group of non-metalliferous minerals is considerably less significant: fireproof, brick-ceramic and other clays, quartz sands, gravel, pebbles and gravel of alluvial quartz, diatomites, alevrites and some sorts of building and architecture stones (limestone, marble breccias, granodiorites and other siliceous rocks, sandstones). Deposits of metalliferous minerals were exploited in the nearer and more distant past - mercury, lead, zinc, silver and gold. None of these minerals was exploited for a long period of time. Large reserves of iron are well known (oolitic ores of "Šumadija"), but they cannot be used profitably due to their unfavourable technological characteristics. Lead and zinc deposits of "Kosmaj-Babe" might have the economic significance in the perspective, but they are explored insufficiently due to lack of the financial means, which is to a certain degree justified from the point of view of the ecological entirety of this area.

The degree of exploitation of mineral resources is low, except lignite and partly non-metals, which makes the optimal valorisation of the space and the appliance of planned postulates and criteria of using the natural resources and protection of the environment difficult.

Disregarding the existence of certain non-metalliferous and metalliferous mineral deposits and the potential increase of the existing reserves, the ore production should not be maintained and developed on the area of the City of Belgrade with wider surrounding up to 20 km on the south. The reason is the closeness of the City and densely populated parts, i.e. the protection of the environment which has already been greatly endangered due to combined influence of many negative factors.

Besides all problems which exist and which are expected, the mineral lignite base of the Kolubara mining basin has still been the basis of the dominant part of the power production not only of the City of Belgrade but of the republic of Serbia as a whole. However, it has to be approached to a multi-variation estimation of what can be the substitution for lignite when its exploitation becomes exhausted.

All other minerals which are exploited or can be the subject of the exploitation in the near future, have only satisfied partly the needs of the area and they have to be provided from other regions (sometimes 100 km away) or by import. That is particularly characteristic for raw materials used in civil engineering such as cement, sand, gravel, building and architecture stone, etc.

4.7. Natural hazards as limiting factor of the spatial development of the city of Belgrade

The natural hazards, as well as measures which are needed to be overtaken in the prevention of their harmful effects, should be taken into consideration while defining the basic aims of the development of an area. Natural disasters cause smaller or larger changes in the environment, considerable material damages, and, most importantly, they can greatly endanger people's lives and health.

In dependence on the physical - geographic conditions of the environment and man's activity, each area has the characteristics and predispositions for a disaster to occur. Their origin, scope and time of lasting cannot be predicted in most of the cases, but it can be supposed that certain phenomena are going to occur on the basis of the experience, statistical data and methods of modelling and prognostication. The measures of protection can be defined by the analysis of these phenomena, whereas the spatial and urban planning plays the significant role in the prevention of harmful impacts and their reduction to the least possible extent.

The endangerment of the area by natural disasters has been an important factor while choosing the location and planning the land use, as well as while defining the degree of the concentration of physical structures and infrastructural facilities. The city of Belgrade, with its population, material and other natural and created resources, has been exposed to natural hazards, but the degree of its endangerment is not extremely high and still it is enough that it can cause considerable consequences, endanger people's health and lives and damage material goods. In order to avoid and diminish the risk these hazards bear, it is necessary to estimate the endangerment of the area by some disasters.

In regard of the most important physical-geographic limitations, i.e. the possibilities of natural hazards to occur, the area of the City of Belgrade belongs to the mean zone of seismic endangerment, it is permanently exposed to the harmful influence of floods and there are locations of active landslides.

The research of the complex and specific problem of the protection from natural disasters was undertaken according to the unique system. On the basis of analysis of the condition, the potentially endangered localities were identified and their classification was done according to four degrees of endangerment, i.e. the consequences that may occur.

Table 5: Degree of consequences caused by natural disasters.

	Floods	Seismicity	Landslides
Without consequences	Conditions for floods do not exist	Not endangered areas (<5 MCS)	Favourable terrains
Limited consequences	Rarely flooded areas	Mean endangered areas (6 MCS)	Conditionally favourable terrains
Significant consequences	Frequently flooded areas	Considerably endangered areas (7 MCS)	Unfavourable terrains
Large consequences	Annually flooded areas	Very endangered areas (8 MCS)	Extremely unfavourable terrains

Source: Filipović D, 2002; Filipović D. and Obradović D., 2004.

4.7.1. Earthquakes

The city of Belgrade is situated on very safe constitution of the ground and it belongs to the mean zone of seismic endangerment. It lies on the moderate quivering area where there have not been any catastrophic earthquakes there, but the possibility of their occurring is not excluded.

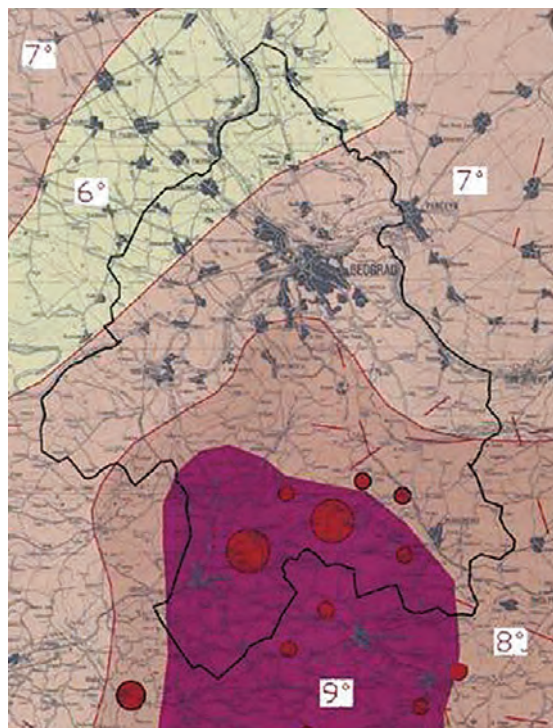
The territory of the City of Belgrade does not have its autochthonous epicentres of strong earthquakes. The earthquake can strike the City with the maximum force of 5 on the Mercalli Scale. The seismic waves from the epicentres of the surroundings can cause stronger earthquakes on the territory of Belgrade. Therefore, Belgrade is endangered most by the Mionica epicentre, measuring 8 on the Mercalli Scale, as well as by the epicentre from the direction of Rudnik Mt., measuring 7 on the Mercalli Scale, then Kosmaj, Svilajnac, Golubac, Fruška Gora and Kopaonik epicentres (6 on the Mercalli Scale). The subsequent strikes of stronger intensity cannot be felt on the area of Belgrade.

On the basis of the Seismic Map of the SFRY (1987), the City of Belgrade lies in the area of 7 on the Mercalli Scale. On the map of detailed micro-seismic regionalisation, it can be seen that the seismic endangerment of the area ranges from 6 to 9 on the Mercalli Scale, as well as that the seismic activity increases from the north towards the south of the territory of the City of Belgrade, so that the region of Lazarevac is the most endangered region (Fig. 12).

In accordance with the seismic plans, all structures are built in such a way that they can withstand one degree stronger earthquakes than predicted.

Figure 12:
Seismic activity of Belgrade and wider surrounding with isolines and zones of basic degree of seismicity (Mercalli Scale).

Source: "Ecological Atlas of Belgrade", 2002.



From the aspect of seismology, the stony complexes with stable, mean and unstable characteristics build the area of Belgrade. The most stable terrains are built of limestone, sandstones, serpentinites and other compact stony masses with weakly expressed ability of decomposition. The terrains of seismically mean stability conditions comprise the greatest area on the territory of Belgrade, built of sands, clay, clayey sands, loess and other similar sediments with more expressive ability of decomposition.

Seismically the most unstable terrains are the terrains built mainly of gravels, sandy clays, mud, as well as all incompact soils and the soils where the level of underground water is relatively high. These terrains are situated on alluvial plateaus of the Sava and the Danube on the Srem and Banat side, as well as in the valleys of the Kolubara and other smaller water currents on the territory of the Šumadija part.

4.7.2. Floods

The area of the City of Belgrade is exposed to the harmful effect of floods. They may have extremely negative influence on the total development of this area, as on people's lives and health, so on material and natural resources.

The risk from floods on the area of Belgrade is planned out on the basis of Waterpower Base of Serbia and many studies done by various institutions (Faculty of Civil Engineering, "Jaroslav Černi" Institute, PS "Srbijavode" – Waterpower Centre "Sava", etc.).

There are several endangered zones on the territory of the City of Belgrade:

- part next to the Sava and the Danube, endangered by high waters of these two rivers;
- area around smaller streams of torrential character. There are about 160 smaller torrential streams on the area of Belgrade which endanger the parts of the city by short, but very dangerous floods;
- underground waters which coincide with high levels of the Sava and the Danube are endangered by low valley zones in the northern part of the territory of the city of Belgrade;
- low parts of old city core (on the right bank of the Sava, especially the zone around the railroad station), are endangered by the breakthrough of drainage waters under the high levels of the Sava and the Danube.

The terrain is zoned on extremely unfavourable and unfavourable terrains. Extremely unfavourable terrains on the territory of the city of Belgrade include the flooding parts of alluvial plateaus. Surface waters in the plain part of the City (alluvium of the Sava and the Danube) and high level of underground waters, characterised for those areas, represent the significant limitation of the normal development and construction and they can cause material damage. Unfavourable terrains include narrow pro-alluvial plateaus and sources, the parts of alluvial plateaus below the peak elevation of 72 a.s.l., as well as oxbows, swamps and meander scars.

4.7.3. Landslides

Landslides represent the greatest limiting factor for the area usage. Besides landslides, there are also areas affected by erosion and rockslide. By "Cadastré of landslides and unstable slopes of the territory of Belgrade" (1988), the rolling-hilly parts of the terrain south from the Sava and the Danube were included. Thus, all the landslide phenomena were noted and defined spatially (2341 phenomena of different forms of instability), by which the precise and complete image on the spreading and the state of landslides and unstable slopes was provided for each registered phenomenon on the area of Belgrade.

Figure 13: A part from the map of the territory of Belgrade for which the cadastre of landslides and unstable slopes is made.



Source: Gojgić D. et al., 1995.

On the basis of "Cadastré of landslides and unstable slopes of the territory of Belgrade", out of the total area comprised by the Cadastre (1693 km²), the unstable terrains include the area of 377 km² (22.27 %), whereof the active landslides include the area of 41 km² (2.42 %), calmed landslides comprise 87 km² (5.14 %), reclaimed ones include 1 km² (0.06 %), while 248 km² (14.65 %) represent the conditionally stable terrains.

The sliding of land is the characteristic of areas built of the Neogene sediments. The terrain is zoned on absolutely unfavourable and unfavourable terrains. The absolutely unfavourable terrains are the terrains with active landslides, being present on several locations, on the area south from the Sava and the Danube. The unfavourable terrains include the areas with the potentially unstable slopes, the terrains where calmed landslides appear and loess scarps with the phenomenon of rockslides. The engineering-geological characteristics of these terrains in the natural conditions are the limiting factor.

4.7.4. Atmospheric disasters

The City of Belgrade is in the area of frequent and intensive phenomena of hail, electrical discharge and downpour of rain. According to mean radar observations, in the summer half of the year, the stormy clouds pass over Belgrade every fourth day, whereof 3-4 per year bear the scales of elemental catastrophes. Generally, the territory of Belgrade is not considerably endangered by atmospheric disasters. The endangerment is manifested through a few (isolated) phenomena without greater consequences except the eventual material damages.

4.8. Zoning of the City according to the limitations of area usage

On the basis of the characteristics of the natural factors, the zones can be selected according to the degree of suitability, i.e. the limitation for construction and area usage (Table 6) on the territory of Belgrade. The zoning is done on the basis of:

- engineering-geological conditions and the suitability of the terrain for the construction (landslides, unstable slopes and inclinations),
- hydrological characteristics of the terrain (areas endangered by floods),
- hydro-geological conditions of the terrain (the level of underground waters),
- micro-seismic endangerment of the terrain (endangerment by earthquakes).

Table 6: Characteristics of natural conditions (limitations in the City of Belgrade according to the degree of the sustainability for construction).

Natural conditions/ limitations	TERRITORY		
	Floods	Seismicity	Landslides
Floods	Areas which are not flooded or they are flooded less than once in 100 years	Areas flooded once in 100–10 years	Areas flooded more than once in 10 years
Hydro-geological conditions	Horizons full of water on depth larger than 3m	Horizons full of water on depth of 1–3m with necessary hydro-isolation works	Horizons full of water on depth less than 1m
Landslides	None	Partially stabilized landslides,calmed	Intensive process of sliding, active landslides
Eroding of shores of water currents	None	Endangered zone less than 10 m wide	Endangered zone more than 10 m wide
Seismicity	Areas to 7 MCS	Areas over 7 MCS	Areas over 8 MCS
Relief	Inclination of areas to 0,10	Inclination of areas from 0,1 to 0,2	Inclination of areas higher than 0,2

Source: Filipović D, 2002; Filipović D. and Pavlović D., 2003.

4.9. Strategic determinations of protection from natural disasters

When defining the basic aims of the development of Belgrade, the endangerment of some parts of the City by natural disasters and other hazards must be taken into consideration, as well as the security measures which are taken for their prevention. The contemporary way of planning the measures of protection from disasters has been based on the valorisation of area, on the basis of which the criteria are defined for selecting the most suitable solutions for the protection of people, material goods and environment from the effect of natural disasters and other hazards.

The protection of the area from endangerment by disasters has to be proportional to the significance and the function of the area. This means that the emphasis is put on the protection of the priorities such as: large urban agglomerations, capital strategic structures (larger industrial structures, steam power plants, hydroelectric power stations, etc.) and structures of the special purpose.

Considering the significance and the function of the area, the protection of Belgrade from endangerment by natural disasters must be of the first rank. That means that the optimal organisation of the urban area will be provided by certain measures and even distribution of structures of urban equipment, as well as adapting the communal and infrastructural facilities for possible extraordinary conditions.

The contemporary concept of the protection proceeds from the fact that it is necessary to define an acceptable level of risk from natural disasters on all levels and in all phases, and to act with an aim of their prevention by the system of preventive, organisational and other measures and instruments.

5. Ljubljana in the system of settlements and centres

Simon Kušar, Nataša Pichler-Milanović

The capital city Ljubljana is the largest urban settlement and town (NUTS 7) in Slovenia with approximately 258.873 (2002) inhabitants followed by Maribor (92.284), Celje (37.547) and Kranj (35.237). In addition there are also ten towns with more than 10.000 inhabitants and twenty towns with more than 5000 inhabitants. According to definition of central places in Slovenia, Ljubljana is the macro-regional centre, together with Maribor. Ljubljana is also the centre of the largest urban municipality (NUTS 5), administrative unit (NUTS 4) and statistical region (NUTS 3) in Slovenia. Ljubljana has also the largest functional urban area, due to travel to work, education, and shopping, covering almost two-thirds of the Slovenian territory. According to the Strategy of Spatial Development of Slovenia (2004) Ljubljana is the national centre of international importance, together with Maribor and the city cluster (conurbation) Koper – Izola - Piran. Despite being one of the smallest capital cities in Europe, Ljubljana is the only city in the cross-border potential European region Alpe-Adria-Pannonia with the status of MEGA – one of the 76 Metropolitan European Growth Areas in Europe 29 countries (ESPON 1.1.1., 2005).

5.1. Settlements, urban settlements, towns, urban areas

One of the specific characteristics of Slovenia is the settlement system based on approximately 6000 settlements of which only 156 are consider as urban settlements. Only 58 urban settlements have the official status of a town.

*Table 7: Population of the largest towns in Slovenia.**

Census years	1900	1931	1948	1953	1961	1971	1981	1991	2002**
Total urban population (%) in Slovenia	17.5	22.7	26.9	29.1	33.2	38.7	48.9	50.5	49.0
Ljubljana	45.017	79.391	98.914	113.666	135.806	173.853	224.817	267.008	258.873
Maribor	31.337	46.251	62.677	70.815	82.560	96.895	106.113	103.961	92.284
Celje	9471	13.576	16.083	18.549	22.424	31.305	33.033	40.710	37.547
Kranj	5220	8308	15.981	17.827	21.477	27.211	33.520	36.456	35.237
Koper	8230	8035	7381	6666	10.512	17.116	23.581	24.704	23.285
Novo mesto	2750	4173	4218	5134	6885	9668	19.741	22.333	22.368

Notes: *population of urban settlements; **rate of urbanisation (49%) in year 2002 was based on calculations of the same number of urban settlements (182) as in year 1991.

Source: Pichler-Milanović, 2005a; SURS (various years).

5.1.1. »Urban settlements«

For the purposes of Census 1981 the Statistical Office of RS had defined 224 urban settlements. At the next Census (1991) only 182 settlements (3 % of the total number of settlements) were defined as urban settlements based on their size, settlement morphology, density and employment structure, comprising half of all inhabitants in Slovenia. In 1991 the official level of urbanisation was 50.5 % (i.e. population living in urban settlements). According to the latest Census (2002) and the same number of urban settlements as in year 1991 (182), the urbanisation rate declined to 49.0 %, as a consequence of the suburbanisation process.³ Rather low rate of urbanisation in Slovenia need to be taken in comparison with the low number of agriculture population. In 1991 less than 10 % of inhabitants in Slovenia were employed in agriculture, while in year 2004 this number was even less than 3 %. The difference means that Slovenia is a country with one of the highest proportion of deagrared population in Europe - i.e. population living in non-urban (rural) settlements but employed in industry and services in (near-by) urban (employment) centres and daily commuting to work.

This number of urban settlements (182) did not take into account suburban settlements of larger (urban) settlements. The criteria according to which suburban settlements could be defined as urban settlements were not known. In order to prepare the new list of urban settlements the Statistical Office of RS decided to use the method that is entirely based on statistical data. The new list of urban settlements and settlements in urban areas was prepared in year 2003 and used exclusively for statistical surveys and analysis. The indicators are joined into four groups of criteria for determining urban settlements: number of inhabitants, morphology (population density, built-up areas), functions (number of jobs, daily migrants, transport connections, services), structural (e.g. number of farms).

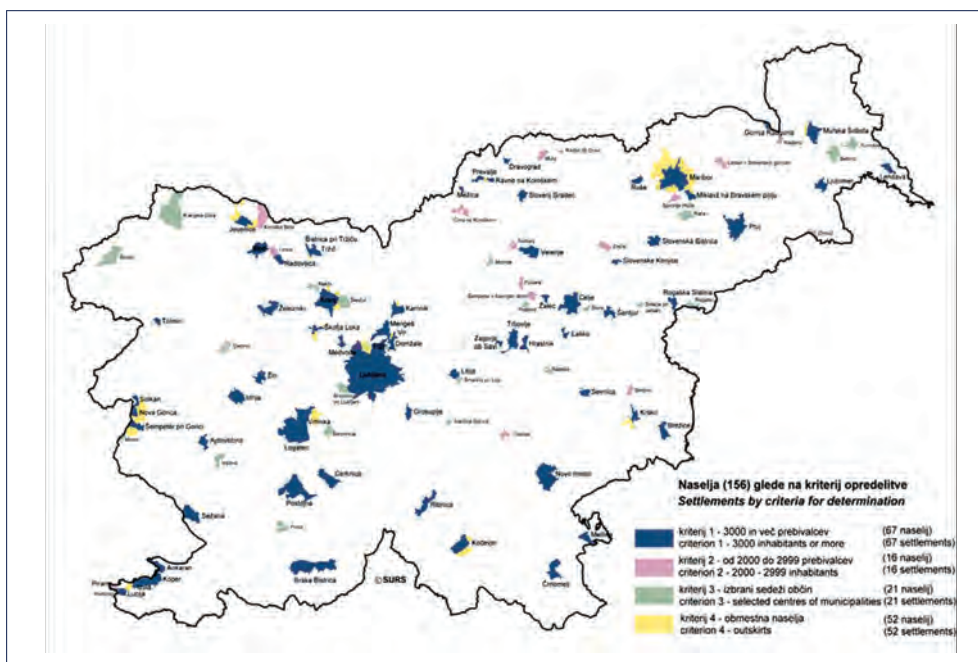
»Urban area« represents the central urban settlement that gives urban areas its name, including all neighbouring (suburban) settlements that are gradually becoming part of it in spatial terms. These suburban settlements are connected with the central urban settlement by built up areas, roads, public parks, and other elements of urban structure. Therefore four types of urban settlements were defined:

- settlements with more than 3000 inhabitants (67 settlements);
- settlements between 2000 - 3000 inhabitants, and a surplus of jobs over the number of employed persons (16 settlements);
- centres of municipalities with at least 1400 inhabitants and a surplus of jobs over the number of employed persons (21 settlements); and
- a combination of criteria for determining (sub)urban settlements that form urban areas (52 settlements). Therefore the list of »urban settlements« with »settlements in urban areas« thus includes total of 156 urban settlements and 104 urban areas. Urban areas only come to be near settlements with over 5000 inhabitants. According to this new classification of urban settlements, the urbanisation rate in Slovenia in year 2002 was 50.8 %, showing the importance of small (non)urban settlements, effected by intensive suburbanisation process in 1990s (Pavlin, 2004).

³ In settlements with less than 500 inhabitants (92 % of all settlements) live 34 % while in 15 settlements (towns) with more than 10.000 inhabitants live 32 % respectively of all inhabitants in Slovenia.

From the original list of 224 urban settlements in year 1981, the present list of 156 urban settlements does not include 46 settlements, while not taking into account 58 settlements that have merged with central urban settlements because of the administrative changes in 1980s in order to form 182 urban settlements in year 1991. The new list of 156 urban settlements (2003) includes 40 settlements that were not determined at the Census 1991.

Figure 14: Urban settlements in Slovenia.



Source: SURS.

5.1.2. Administrative definition of »towns«

According to the Local Self-government Act (1994) a "town is a larger urban settlement that in terms of population size, economic structure, density and historical development differs from other settlements". A town has a population of more than 3000 inhabitants. A settlement obtains town status by decision of the National Assembly of RS. As regards settlements that have already been given a »town« status in accordance with regulation valid when the status was given, the National Assembly can only confirmed their status ("historic towns"). Therefore according to the Official Journal of Republic of Slovenia (no. 22/00 and no. 122/05) there are 51 towns in Slovenia. Some municipal councils declared another 7 towns. There are also some (urban) settlements with no status of a »towns« despite fulfilment of criteria defined by the Local Self-government Act. Therefore there are 58 urban settlements in Slovenia with the status of »towns«. There are no official definitions as yet for medium-sized cities or small towns. Therefore Ljubljana is the largest urban settlement and a town (247.772 inhabitants) and urban area (249.442 inhabitants) in the system of settlements in Slovenia.

5.2. Network of »central places«

First studies of central places in Slovenia date in late 1960s, when Vrišer and Kokole defined central places in Slovenia, their hierarchy and gravitation influence. In 1971 Kokole prepared a new thorough research on central places in Slovenia. The next important milestone in analysing central places in Slovenia was in 1987, when Vrišer prepared a new categorization of central places in Slovenia. He used almost the same indicators as in his previous research. He defined 600 central places in seven hierarchical levels. Vrišer prepared a new analysis of central places also in 1994 using the same methodology as in the year of 1987. He defined 612 central places (Černe et al, 2007).

Table 8: Research on central places in Slovenia and position of Ljubljana in the hierarchy of central places.

Author	Hierarchy of central places in Slovenia	Position of Ljubljana
V. Kokole (1968)	8 levels (cities only; separate categorization for industrial and rural centres)	the highest position
I. Vrišer (1968)	7 levels (265 central places): • local centres • municipal centres • county centres • district centres • sub-regional centres • regional centres - national centres	6 th level (regional centre), but the highest in Slovenia (classification was prepared for the territory of Yugoslavia)
V. Kokole (1971)	9 levels (534 central places): • sub-central village • central village • rural centre • 7 hierarchical levels of towns	the highest position (9 th level)
I. Vrišer (1987)	7 levels (600 central places): • local centres • rural and industrial centres • communal centres • county centres • district centres • provincial centre • republican centre	the highest position (7 th – republican centre)
I. Vrišer (1994)	7 levels (612 central places): • local centres • rural and industrial centres • ex-communal centres • county centres • district centres • provincial centre • republican centre	the highest position (7 th – republican centre)

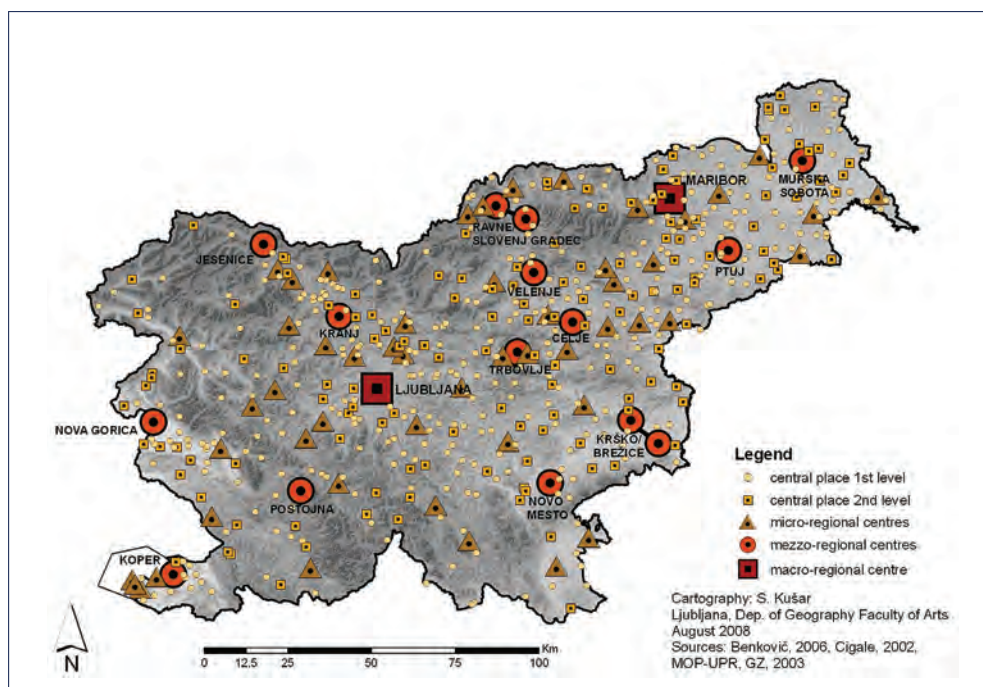
Source: Černe et al, 2007.

The latest research on central places in Slovenia was conducted by Cigale (2002) and Benkovič-Krašovec (2005). Cigale prepared the central-place relationship study in 1999. On the basis of questionnaires and statistical data about provision of central places with different services he distinguished two macro-regional centres (Ljubljana, Maribor), 17 mezzo-regional centres and 79 micro-regional centres. Besides that there are also numerous smaller, less important centres on the lower hierarchical levels.

When comparing his results with central-place hierarchy of Vrišer from 1987, he pointed out numerous changes in the central-place relationship, especially on the micro-regional level, where due to the growing importance of some of smaller centres the network of micro-regional central places has become denser. The importance of smaller settlements, which are municipal centres now, has been enlarged, as well (Cigale, 2002). Cigale did not highlight the role of Ljubljana as the capital city and the centre of (inter)national importance.

Cigale (2002) discussed only the role of central places of higher ranks, while Benkovič-Krašovec prepared a thorough study of central places at lower levels. According to presence of selected services in settlements she defined 358 central places of the first level and 132 settlements of the second level (Černe et al, 2007).

Figure 15: Central places in Slovenia in the middle of the first decade of the 21st century.



A comparison of different categorization of central places in Slovenia shows, that in the system of 6000 settlements only 10 % of settlements have some role from the aspect of distribution of central place activities of which Ljubljana has the highest position. Ljubljana was put on the highest position in central place hierarchy, because it was the largest settlement in Slovenia with many economic functions and because Ljubljana was

the republican centre. After the independence of Slovenia in year 1991 Ljubljana became also the national capital and hence increased its role in the system of central places in Slovenia. The gravitation influence of Ljubljana as a macro-regional centre increased as well spreading now across two-thirds of Slovenia. It is interesting, that gravitation influence of Ljubljana can be partly noticed also in the most north-eastern part of Slovenia (i.e. Pomurje region), which is spatially closer to Maribor, the second largest city (Cigale, 2002). The gravitation influence of Ljubljana within the bordering NUTS 3 regions of the neighbouring countries of Italy, Austria, Hungary and Croatia has not been studied, yet.

5.3 Local government reforms

5.3.1. NUTS 5: »urban municipalities«

According to the Local Self-government Act (1994) the number of municipalities (NUTS 5) has been constantly increasing from 62 communes in year 1994 to 147-192-193-210 municipalities in year 2006. The process of decentralisation has not been completed as yet. The Local Self-government Act defines »urban municipality« as: densely populated settlement(s) of a unique territory inter-linked with daily migrations of population. The town is granted a status of urban municipality with at least 20.000 inhabitants and 15.000 jobs of which more than half are in service sectors and represent geographic, economic and cultural centre of the functional urban area. The status of urban municipality needs to be confirmed by the National Assembly of RS after local (municipal) referendum. Therefore among 210 NUTS 5 municipalities (2006) in Slovenia, only 11 NUTS 5 municipalities have the status of urban municipalities: Celje, Koper, Kranj, Ljubljana, Maribor, Murska Sobota, Nova Gorica, Novo mesto, Ptuj, Slovenj Gradec, and Velenje. Ljubljana is the largest urban municipality in Slovenia with (279.653 inhabitants in 2010). It is also worth mentioning that half of the new NUTS 5 municipalities (106 of 210) in Slovenia have no urban settlements as their municipal centres.

Local government reforms in year 1994 also transformed the city of Ljubljana administratively and spatially. The official city territory of Ljubljana was reduced from 902 to 272 km². The administrative division of the city agglomeration into five communes was abolished with establishment of the City Municipality of Ljubljana and 9 surrounding NUTS 5 municipalities. In 1995 the City Municipality of Ljubljana became the largest local authority in Slovenia. The City Municipality of Ljubljana is divided in 17 local city districts. The City Municipality of Ljubljana has directly elected Mayor (with four deputy mayors appointed by the Mayor), the City Council (45 directly elected local politicians), City Management Authority (with more than 20 different departments and offices), 17 local city districts, and other legislative, management or advisory bodies (www.ljubljana.si).

5.3.2. NUTS 4: administrative units

In Slovenia there are also 58 territorial administrative units (NUTS 4) that serve as outposts of the state administration. These NUTS 4 areas are equivalent to former larger communes (or NUTS 5) with the exception of Ljubljana (former five communes) that became one NUTS 4 after year 1994. Between years 1955 - 1995 in Slovenia, former communes (or current NUTS 4 areas) represented basic local units for implementation of polycentric

development policies (spatial and regional) since 1970s onwards. Today NUTS 4 areas are still important as local labour system, and therefore they can be considered as »micro-regions«. These administrative units perform tasks for all ministries. With respect to organization, the employees of these administrative units report to the ministry responsible for administration, while the ministries monitor the operations of administrative units, each for their own field of work. The NUTS 4 Ljubljana is the largest administrative unit in Slovenia with 323.200 inhabitants covering the territory of 902 km².

5.3.3. NUTS 3: »statistical« and »development« regions

Until year 2009 no regional NUTS 3 administrative level as the second level of local self-governance has been established in Slovenia, due to long political negotiations about their number and size. However, Slovenia has been using 12 »statistical« regions as NUTS 3 spatial division of the national territory. The basis for determination of statistical NUTS 3 regions was "12 areas of inter-municipal cooperation" which originated from academic findings in 1970s⁴. Statistical NUTS 3 regions in Slovenia are incorporated into the European Union law through the European system of NUTS regions.

Ljubljana is a regional centre of Osrednjeslovenska (Central Slovenian) statistical NUTS 3 region. Osrednjeslovenska statistical NUTS 3 region is the largest region in Slovenia by population size with 488.364 inhabitants (2002) or 24.9 % of total Slovenian population but not by the size of its territory (12.6 % of Slovenian territory). Osrednjeslovenska statistical region is often called now "Ljubljana urban region", especially after establishment of the Regional Development Agency of Ljubljana Urban Region in year 2002. The city of Ljubljana (NUTS 7) contributes 53 % of the population to Osrednjeslovenska statistical NUTS 3 region.

Although current 12 NUTS 3 statistical regions in Slovenia are originally used mainly for collection and analysis of statistical data, they are far more important now as they are used also as »development« regions in which instruments of regional policy at the national and EU level are being implemented. However, Ljubljana and Osrednjeslovenska NUTS 3 region do not enjoy any special position in the framework of Slovenian regional policy and planning.

Recently, there had been intensive power put into the transformation of the NUTS 3 (statistical or development) regions into pokrajine (provinces) as the second level of the local self-governance. In year 2007 the Government of the Republic of Slovenia proposed 13 new administrative regions (provinces). This proposal was a result of intensive scientific efforts taking place already in 1990s, public discussions and political bargaining process. The proposed map of the NUTS 3 provinces was partly similar to current statistical or development NUTS 3 regions, but with some important modifications. Osrednjeslovenska NUTS 3 province would be composed of the former Osrednjeslovenska statistical region and Zasavska statistical region together with north-eastern part of Notranjsko-kraška statistical region and western part of statistical region Jugovzhodna Slovenija (e.g. Kočevsko and Ribniško area). The municipality of Ljubljana (NUTS 5) would be its own NUTS 3 province as the only urban NUTS 5 municipality in Slovenia having also the status of the NUTS 3 province. This proposal was evaluated by the citizens of Slovenia on the referendum in June 2008.

⁴ The basis for creation of 12 areas of "inter-municipal cooperation" was Vrišer's classification of 12 "functional regions" (Vrišer, 1997).

Referendum was successful in most parts of Slovenia except in Obalno-kraška statistical region and in Osrednjeslovenska statistical (Ljubljana) region. On the basis of the referendum results and additional scientific and public evaluation the Government of RS prepared new proposal with 13 NUTS 3 provinces. The proposed Osrednjeslovenska NUTS 3 province was divided into two parts and with the urban municipality of Ljubljana as its own NUTS 3 province.

Unfortunately, there was no political will to complete the process of regionalisation therefore Slovenia still has not introduced the administrative NUTS 3 regions (provinces) as the second level of self-governance. Ljubljana therefore does not enjoy the status of its own province.

5.3.4. NUTS 2: European “cohesion” regions

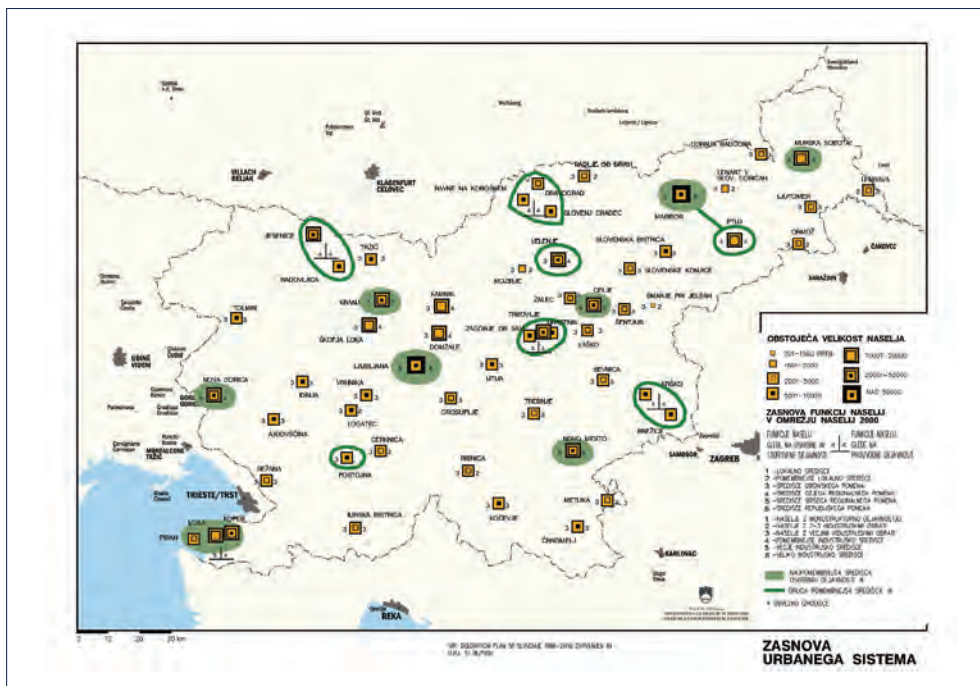
NUTS 2 macro-regions are very important in the EU regional policy, because they are territorial units for which financial aid in the framework of cohesion policy can be received. Until year 2008 the whole Slovenia was considered as one NUTS 2 (European) region. From January 2008 there are two NUTS 2 European (or »cohesion«) regions: West Slovenia (consisting of 4 more developed NUTS 3 statistical (or development) regions: Osrednjeslovenska region with Ljubljana, Gorenjska, Obalno-kraška and Goriška regions) and East Slovenia (consisting of 8 less developed NUTS 3 statistical or development regions: Jugovzhodna Slovenija, Zasavska, Spodnjeposavska, Savinjska, Koroška, Podravska, Pomurska and Notranjsko-kraška regions respectively). However, this has not influenced the implementation of the cohesion policy in Slovenia during the 2007 - 2013 programming period, because Slovenia is eligible for the status of “convergent region” in the EU until 2013. Later two cohesion NUTS 2 macro-regions will be more important, because it is expected that the more developed West Slovenia NUTS 2 region would not be eligible for special financial assistance from the EU Structural Funds anymore. Therefore, two NUTS 2 macro-regions in Slovenia are now important mainly for statistical reasons, but without political or administrative representations.

5.4. Polycentric urban and regional development concepts

According to the implementation of the hierarchy of central places defined by Vrišer in 1980s, seven levels of central places were designed for spatial planning and regional policy purposes: local centres (1 - 4 lower level) and regional centres (5 - 7 higher level) in the Long-term Development Plan of Slovenia 1986 - 2000 adopted in year 1986 as the comprehensive strategy for social, economic, spatial, regional and environmental development of the Republic of Slovenia within the Yugoslav Federation. This development plan was formulated according to the concept of polycentric development taking in consideration specificities of different (geographical) areas (»planning regions«) and the network of regional and local centres (58 towns) with different population size and functions. The most important 12 regional centres were: Ljubljana, Maribor, Celje, Kranj, Novo mesto, Nova Gorica, Murska Sobota, Postojna, and several city clusters (conurbations)

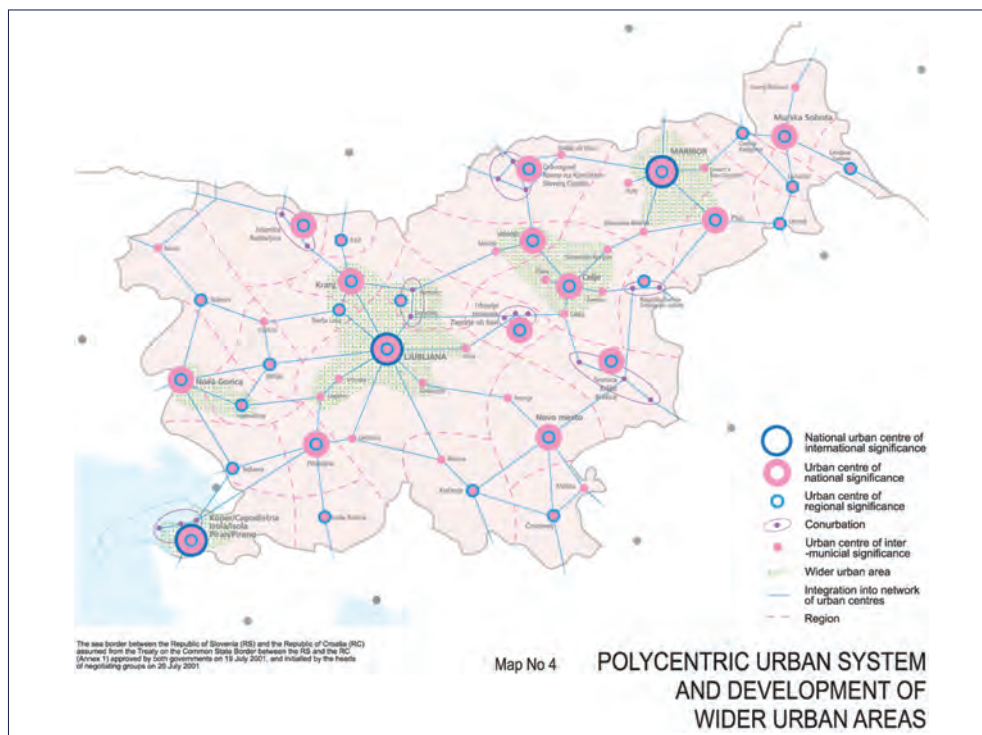
such as: Koper – Izola - Piran, Trbovlje – Zagorje - Hrastnik, Slovenj Gradec - Ravne na Koroškem - Dravograd, Krško - Brežice; Jesenice - Radovljica, with their gravitation areas (i.e. »planning regions«) covering the whole territory of Slovenia.

Figure 16: Long term development plan of SRS 1986-2000: Urban network of 15 regional centres and 43 local centres with city clusters (conurbations).



After independence of Slovenia in year 1991 and the local government reforms taking place since year 1994 with transformation of former communes (62) to new NUTS 5 municipalities, this urban hierarchy has been slightly transformed in the Spatial Development Strategy of Slovenia (2004) defining »centres of (inter)national, regional, inter-municipal importance« - together 51 »urban centres« with 64 towns and other urban settlements, taking into consideration also urban conurbations (city clusters) at all levels. The most important regional centres (or the »centres of national importance«) in SPRS (2004) are: Ljubljana, Maribor, conurbation Koper – Izola - Piran, Celje, Kranj, Novo mesto, Nova Gorica, Murska Sobota, Velenje, Postojna, Ptuj, and conurbations: Slovenj Gradec - Ravne na Koroškem - Dravograd, Jesenice – Radovljica (Bled), Zagorje – Trbovlje - Hrastnik, Krško – Brežice - (Sevnica) with their (15) potential gravitation zones (i.e. functional urban areas) that are not territorially specified and overlap between each other. Ljubljana, Maribor and conurbation Koper – Izola - Piran are also named as »centres of international importance« due to their population size, the status of a capital city of Ljubljana, the importance of the port of Koper for Central Europe, and geographical location of urban conurbation Koper – Izola - Piran near the borders with Italy and Croatia, and the second largest city of Maribor near the border with Austria, close to Hungary and Croatia.

Figure 17: Polycentric urban system and development of wider urban areas.



Notes: 51 »urban centres« = 43 towns+ 8 urban conurbations (21 towns and urban settlements) = 64 towns and urban settlements:

- 3 »centres of international importance«: Ljubljana + Maribor + Coastal conurbation (Koper – Izola – Piran);
- 12 »centres of national importance«: 8 towns (Murska Sobota, Ptuj, Celje, Velenje, Kranj, Novo mesto, Postojna, Nova Gorica) + 4 urban conurbations (Jesenice – Radovljica – (Bled); Zagorje – Trbovlje – Hrastnik; Slovenj Gradec – Ravne – Dravograd; Brežice – Krško – (Sevnica);
- 16 »centres of regional importance«: 13 towns +3 urban conurbations (Domžale – Kamnik; Šmarje pri Jelšah – Rogaška Slatina; Tržič – Bistrica);
- 20 »centres of inter-municipal importance«.

Source: Spatial Development Strategy of Slovenia (2004).

These 15 »centres of national importance« are also regional centres in Slovenia. Twelve of them are also centres of statistical NUTS 3 regions. Towns of Ptuj and Velenje in eastern Slovenia were in year 2008 proposed by the Government of RS as centres of two new administrative NUTS 3 provinces. Only one »centre of national importance« - city cluster (conurbation) Jesenice – Radovljica – (Bled) in Gorenjska statistical NUTS 3 region has not been officially proposed as the centre of new administrative NUTS 3 province.

In the polycentric development concepts from 1980s, the most important urban centres in Slovenia (e.g. regional centres) with their gravitation areas (planning regions) were already highlighted. The new polycentric urban development concept (as before) emphasise the improved (equal) accessibility to public goods – administration, jobs, services and knowledge, that are located in these urban centres which are also important transportation nodes in Slovenia, and in Central Europe. Therefore polycentric development of (3-12-16-20) regional and local (urban) centres corresponds to the balanced regional development concept and development infrastructure along main European corridors V and X. During the preparation of the (revised) polycentric development concept in the Strategy of Spatial Development of Slovenia (2004), the importance of urban agglomerations, city clusters and their morphological and functional urban areas are being envisaged by the experts and policy makers, with potentials for cross-border cooperation taking in consideration improved cross-border mobility, accessibility, institutional links and networks, and cross-border, inter-regional and trans-national cooperation, and Slovenia's accession to the EU in year 2004.

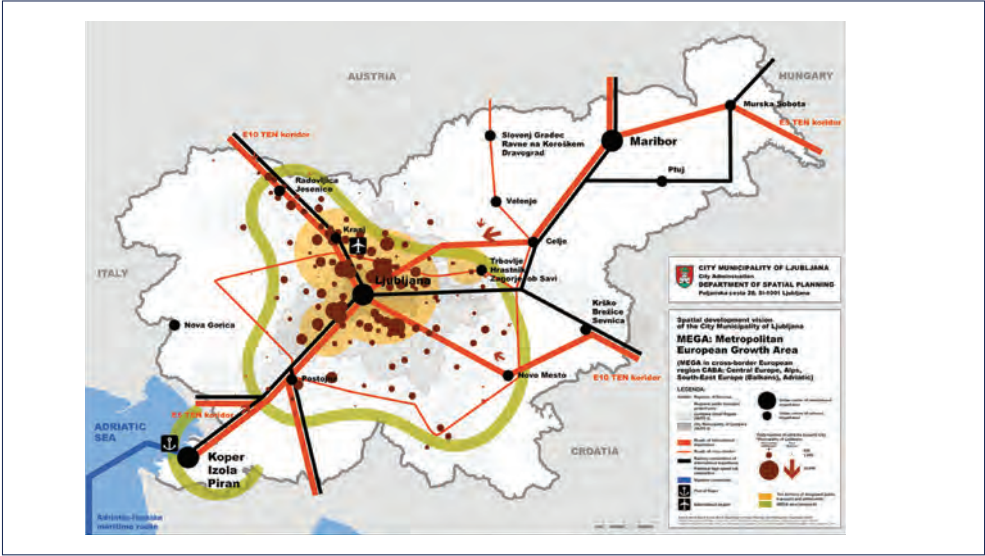
5.5. Functional urban areas

Most jobs and economic activities in Slovenia are concentrated in the urban areas of Ljubljana, Maribor, Celje, Coastal conurbation Koper – Izola - Piran, followed by Kranj, Novo mesto, Velenje, Nova Gorica. Therefore travel-to-work migrations are the most intensive towards these cities. Most intensive daily commuting occurs in the gravitation areas of the largest employment (regional) centres such as Ljubljana, Kranj, Maribor, Celje, Velenje, Krško - Brežice, Koper – Izola - Piran, Novo mesto, Nova Gorica, Ptuj, Slovenj Gradec - Ravne na Koroškem, Murska Sobota. The Strategy of Spatial Development of Slovenia (2004) promotes 15 »centers of national importance« (e.g. regional centres), including four city clusters, and their gravitation and commuting zones as potential functional urban areas, even though they are not territorially defined. Twelve of these 15 centres of national importance are also centres of current 12 NUTS 3 (statistical or development) regions.

The project ESPON 1.1.1 (2005): Potentials for polycentric development in Europe was taking in consideration functional urban areas (FUA), as travel-to-work areas of the main urban centres according to the common criteria implemented for approximately 1600 FUA in 29 European countries. The FUA consists of an urban core and the surrounding area that is economically integrated with the centre, and represents the (sub)regional labour market area.⁵ The analysis of FUA in Slovenia was prepared firstly according to the proposed methodology without any special modifications. As a result six FUA of European importance were selected: Ljubljana (with Kranj), Maribor (with Ptuj), Celje (with Velenje), Novo mesto, Koper – Izola - Piran and Nova Gorica. According to the weighted results of ESPON 1.1.1. indicators, Ljubljana FUA is the only one urban area in Slovenia with the status of "weak" MEGA (Metropolitan European Growth Area) as one of 76 MEGAs in Europe. Due to the sea port function of international importance Koper – Izola - Piran FUA was given the status of transnational/national FUA while Maribor (with Ptuj), Celje (with Velenje), Novo mesto, Nova Gorica are identified as regional/local FUA.

⁵ The quantitative criteria are described in the following way: "In countries with more than 10 million inhabitants, a FUA is defined as having an urban core of at least 15.000 inhabitants and over 50.000 in total population. For smaller countries, a FUA should have an urban core of at least 15.000 inhabitants and more than 0.5% of the national population, as well as having functions of national or regional importance.

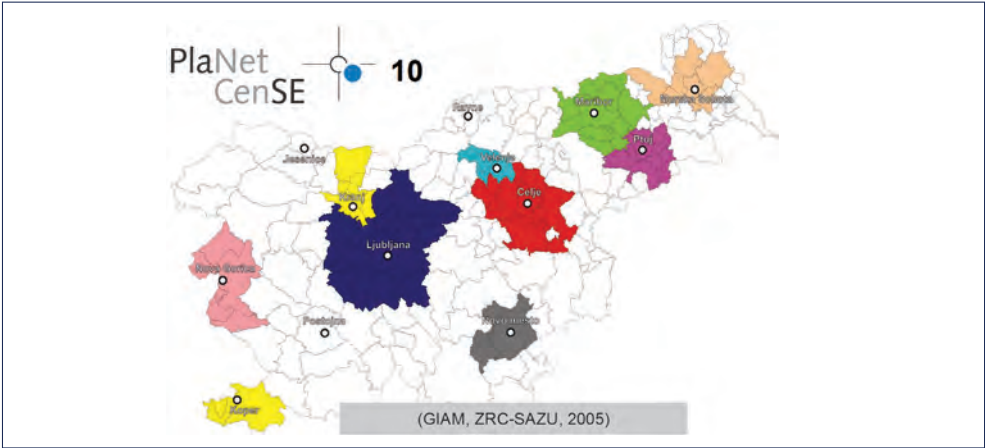
Figure 18: Ljubljana as MEGA.



Source: City Municipality of Ljubljana, Department for Urban Development, 2007.

As it is important for Slovenia to remain focused on small towns and middle-sized cities, and for the purpose of implementation of the INTERREG IIIB project PLANET CENSE in Slovenia, the Ministry of Environment and Spatial Planning of RS (re)defined 10 FUA in year 2006 showing the most important regional centres – Ljubljana, Maribor, Koper – Izola - Piran, Celje, Kranj, Velenje, Novo mesto, Nova Gorica, Ptuj, Murska Sobota. Despite lower criteria for identification of other urban centers, the project did not take in consideration four city clusters of national importance (as one urban centre) with the common travel-to-work and gravitation areas. Therefore it is more likely to talk about 14 FUA of European importance in Slovenia, including MEGA Ljubljana that are also important urban nodes in a polycentric and balanced development of Slovenia.

Figure 19: Functional urban areas in Slovenia.



Sources: ESPON 1.1.1, 2005; Planet CenSE, 2006.

Most recently »Strategy for Regional Polycentric Urban System in Central-Eastern Europe Economic Integration Zone« (RePUS 2007) project implemented under the framework of the EU programme INTERREG IIIB CADSES addressed the problems of a more balanced, sustainable and polycentric urban system of middle-sized cities and small towns, that could contribute to strengthening of emerging Potential Economic Integrating Zone (PEIZ) in Central and Eastern Europe. According to the RePUS methodology implemented in Austria, Italy, Hungary, Czech Republic, Hungary and Slovenia, 42 local functional urban areas (as local labour systems) and 17 regional functional urban areas (as regional labour systems) were identified in Slovenia. According to the selected RePUS indicators the urban hierarchy in Slovenia is dominated by the position and role of the capital city region of Ljubljana, followed by the urban area of the middle-size city of Maribor, Celje, Kranj, city cluster Koper-Izola-Piran, Velenje, Nova Gorica, Novo mesto. Ljubljana FUA is even larger than Osrednjaslovenska NUTS 3 statistical region (or Ljubljana urban region).

5.6. The role of Ljubljana in cross-border (potential) integration zones

The Republic of Slovenia borders four countries: Italy (the common border length is 232 km), Austria (330 km), Hungary (102 km) and Croatia (670 km), and the Adriatic Sea (coastal length is 46.6 km). Geographically, Slovenia is located at the cross-roads of Alpine, Pannonian and Mediterranean regions. The capital city of Ljubljana is located in central Slovenia and metropolitan area covers almost one-third of Slovenian territory. Taking in consideration the close-by location of cities of a similar size to Ljubljana and other regional centres in Slovenia such as Trieste, Gorizia, Udine (Italy), Graz, Villach, Klagenfurt (Austria), Rijeka, Pula, Karlovac, Varaždin (Croatia), and comparative results of European projects the main urban areas in Slovenia are able to compete and cooperate on the equal basis with other near-by urban areas across the national border. Ljubljana and Zagreb are the only capital cities in this cross-border area. Zagreb is the largest city in this cross-border area, but Croatia is not the member of the EU, therefore the position and potential role of Ljubljana is even more important in this city network (Pichler-Milanović, 2005b).

Cross-border links and networks between Italy, Austria, Slovenia and Croatia have been developed since 1960s. Yugoslav citizens did not need travel visas for Austria, Italy and many other European countries. In the past Slovenia and Croatia were both part of Austro-Hungarian Monarchy until the First World War and Yugoslavia between years 1918 - 1991. After independence of Slovenia and Croatia in year 1991 the official border crossings were put in place, but no visa regime introduced. The citizens of both countries could cross the border only with the identity card. From January 2008 the border between Slovenia and Croatia becomes external EU border with tight regulatory (»Schengen«) requirements.

The Alps-Adriatic Working Community (Alpe - Adria) was established in year 1978 as an important step towards a new future for Europe. The main task of this cross-border and inter-regional association is joint informative expert treatment and co-ordination of issues in the interest of the current members – countries, counties, and regions from: Austria (Burgenland, Carinthia, Upper Austria, Styria), Italy (Friuli – Venezia – Giulia, Lombardia, Veneto), Hungary (Baranya, Somogy, Vas, Zala), Croatia and Slovenia. The Alps - Adriatic

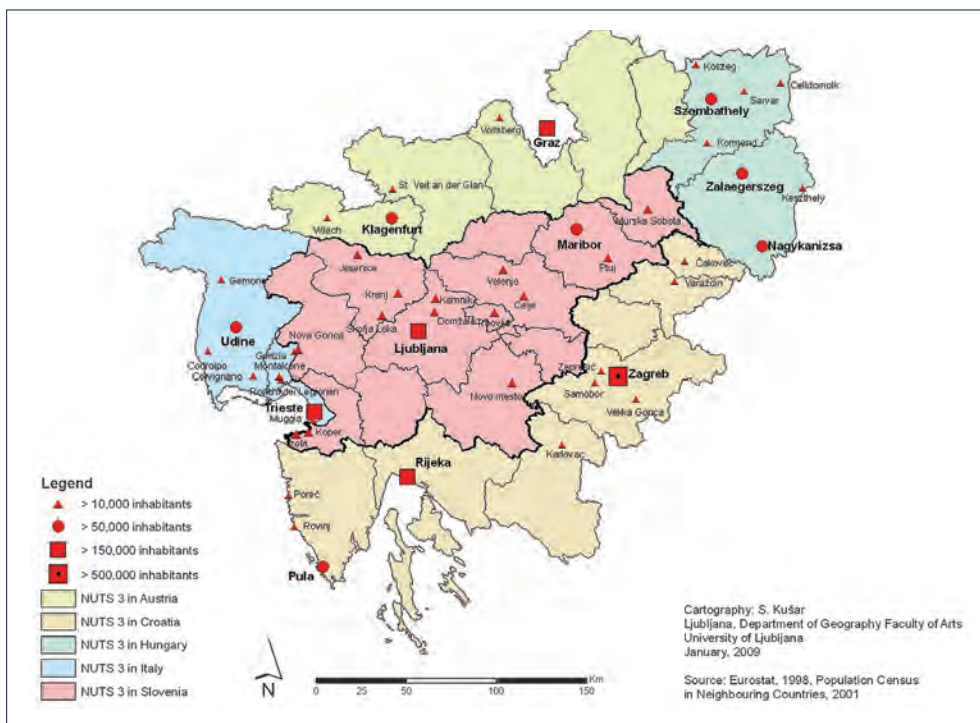
territory covers a total area of 190.423 km² and is home to about 26 million inhabitants. The Alps-Adriatic Working Community has no legal status or central administration, and costs of activities are borne by each member state itself. The most important projects have been concerned with regional development, transport infrastructure, environment, and promotion of tourism. The members of the Alps - Adriatic Working Community have come together at a hot spot of European integration. The socio-cultural contacts in this area are of great importance for the success of European integration. Shared history and past experience serve to prove that future-oriented cooperation is essential in this part of Europe. Slovenia has been always very active in many activities of the Alps - Adriatic Working Community (www.alpe-adria.org).

Taking in consideration Slovenia's geo-strategic location as the crossroad between Central Europe, the Mediterranean, and South-East Europe, the Spatial Development Strategy of Slovenia (2004) also envisage the active role of Slovenia in European links and networks – through integration in European-wide infrastructure corridors (TEN), especially corridors V and X, and participation in different European urban networks - cross-border, inter-regional and trans-national associations, etc. Special emphasis is given to development of stronger links between Slovenia and cross-border cities and regions in neighbouring countries of Italy, Austria, Hungary and Croatia, especially through joint programmes and projects funded by EU structural, cohesion and regional funds. The city of Ljubljana could play an important role as being the only capital city of the EU member state in this cross-border area vis-à-vis Trieste, Udine, Graz, or Zagreb. At the same time enhanced competitiveness and sustainability of small towns and medium-sizes cities in the border areas of Slovenia, could be strengthened with further development of tourism and cultural activities through cooperation with cities of the similar size and function across the borders in Italy, Austria, Croatia and Hungary.

Recently the name of Alpe – Adria - Pannonia is associated with the INTERREG III B project MATRIOSCA (2006 - 2008), aimed at proposing the institutional structure for the implementation of common projects in this cross-border area, located at the interface of old and new EU member states that involves regions from Austria, Italy, Hungary and Slovenia, as well as from Croatia, as a EU candidate country (www.matriosca.org). Alpe – Adria - Pannonia has a possibility of becoming a new potential EU region in Central Europe, similar to CENTROPE cross-border EU region between: Vienna (A) – Bratislava (SK) – Brno (CZ) –Gyor (HU).⁶ The capital city of Ljubljana is according to some scenarios, seen as the centre of this new potential EU region due to central location of Ljubljana and Slovenia in the Alpe – Adria - Pannonia, improvements in transport infrastructure, better accessibility, fully-fledged EU membership. For historical and political reasons, the development axis towards South-East Europe is also in the strategic interest of Slovenia, capable of taking development initiative in this part of Europe. Other potential cross-border inter-regional links and connections are between the North Adriatic ports Koper (SI) – Trieste (IT) – Rijeka (CRO) that could become an important transportation node able to compete with the largest Mediterranean and North European ports. Maribor (together with towns of Ptuj and Murska Sobota) could take an active part in polycentric urban network with the nearby Graz (A), Varaždin - Čakovec (CRO), and towns in Hungary (Zalaegerszeg/Szombathely).

⁶ MATRIOSCA Alpe-Adria-Pannonia: NUTS 2: Friuli-Venezia-Giulia, Veneto (IT) /NUTS 2: Burgenland, Carinthia (AT) /NUTS 1: SLOVENIA /NUTS 3: Baranya, Győr-Ménfőcsanak, Somogy, Tolna, Vas, Zala (HU) /Istra, Kopriivnica-Križevci, Varaždin (HR) / NUTS 2: Vojvodina (SR) is the new potential cross-border EU region as part of the Alps-Adriatic Working Community (www.matriosca.net).

Figure 20: Position of Ljubljana in the southeastern part of Alpe-Adria-Pannonia.



6. Urban settlements network - instrument of the spatial- functional organization of the Republic of Serbia

Dragutin Tošić, Marija Nevenić

The area of Serbia, as well as the great part of South East Europe is insufficiently urbanised. The intensive urbanisation of Serbia began in the second part of the 20th century. Almost up to the 1960s, Serbia had exclusively agricultural character by the economic structure, while it was rural area by the structure of population.

The slow growth and the functional development of towns were interrupted by the social determination that the economic structure of the country should change by strengthening of industry. The economic situation in the Republic was changed by the gradual development of industries which also implied the changes in the spatial distribution of population and in its biological and socio-economic structures. The intensive urbanisation, on one side and deagrarization, on the other, caused by radical changes in social relations, brought to rapid migration of population from villages to towns, i.e. from less developed areas of the country into more developed ones, which was also followed by the intensive socio-economic, demographic, functional and physiognomic changes of settlements. The processes were partly planned and more often they developed spontaneously and elementally, having many positive and negative consequences.

6.1. Urbanisation - basis of development of urban centres and urban regions of Serbia

Industry, located according to its locational demands and conditions, was the main function in the development of cities. On certain level, it initiated the development of urban settlements, so that they could latter on, encourage the development of industry by their agglomerative advances. By the time, in the conditions of agglomerative economy, the double industrialisation-urbanisation link, based on the logic and principle of circular and cumulative causation, influenced the concentration of other functions in cities, strengthened their functional capacity and accelerated the overall socio-economic development. In the initial transitional phase, the urban functions were concentrated in the city cores, while in later phases, with the development of tertiary-quaternary activities, it came to the expansion of the urban way of life in the settlements of outer and inner urban surroundings. The processes of peri-urbanization, suburbanisation began and the spatial-functional dichotomy of village-town was gradually disappearing (Djurić, V., 1970.). The cumulation of functions and the mutual affect with other relevant factors

caused the reinforcement of networking the cities and their regional surroundings. The consequence was the diffusion of urbanisation and urbanity and the transformation of settlement structures in the area of urban impacts. The urbanisation economic base was the development of functions of labour centres -its flows, transitional phases and succession. The development of functions of labour centres in Serbia was developing in two phases. In the first phase, the function of labour directed the spatial-functional stream lines towards urban settlements, giving them the role of poles of concentration of functions and population, while in the second phase, the spatial-functional stream lines were directed from the centres of labour towards the regional surrounding, giving them the role of development centres or urbanity and urbanisation diffusion centres, i.e. the mediator of the structuring of urbanised regions.

More significant influences of larger cities on the transformation of their surroundings began in the 1960s, middle-size towns in the 1970., while smaller urban centres in the 1980s (Veljković, A., Jovanović, R., Tošić, B., 1995.). The influences of larger cities on the settlement-functional organisation of the regional surrounding were manifested by the demographic exodus and depopulation of rural settlements on one side, and the growth and development of urban and less or more urbanised settlements on the other side. That brought to the continual growth of urban population, functional and physiognomic development and transformation of the existing towns, the formation of new urban settlements (development of new towns - suburbs of industrial or residential character or by the transformation of mixed settlements into urban settlements), gradual urbanisation of suburban villages, as well as to the reduction of population of some villages even to their demographic disappearing (Tošić, D., Krunić, N., 2006.). Due to demographic redistribution which is lasting for the last five decades, one part of villages (suburban) is merging with the cities, the other part is becoming urbanised, while the most part is reducing or disappearing by the emigration of fertile and active population contingent. The reduction of the rural population was the resultant of the long-term emigration and decrease of natural increment. Simultaneously, the cities recorded the demographic growth and both natural and migration component prevailed. The immigration was preponderant to the 1980s, while the natural increment has prevailed since then to the present day. The high degree of correlation was established between urbanisation, spatial mobility and natural increase of the population of Serbia (Vojković, G., 2007.).

According to the 1953 Census, one-fifth of the total population (22.5 %) lived in urban settlements, while two-thirds of active population (67 %) was rural population. Vojvodina was the most urbanised with 29.5 % of urban population, then central Serbia with 21.2 % and Kosovo and Metohija with only 14.6 % of urban population. Even though the degree of urbanisation increased on around 56 % to 2002., the urban population did not increase equally. In the period between 1953. and 1961., the share of urban population increased on 29.8 % with the average growth rate of 48 ‰ (central Serbia 28.6 %, Vojvodina 38.3 %, Kosovo and Metohija 19.5 %). In the period from 1961. to 1971., the growth rate of urban population was 41.7 ‰, while the degree of urbanisation increased on 40.6 % (central Serbia 40.8 %, Vojvodina 48.8 %, Kosovo and Metohija 26.9 %). In the period between 1971. and 1981., the growth rate decreased on 23.8 ‰, while the share of urban population in total population increased on 46.6 % (Central Serbia 47.8 %, Vojvodina 54.1 %, Kosovo and Metohija 32.5 %). In the period between 1981. and 1991., the growth rate was far lower (13.6 ‰), while the degree of urbanisation increased on 50.7 % (Central

Serbia 53.5 %, Vojvodina 55.7 %, Kosovo and Metohija 37.5 %). In the mentioned period, the share of rural population in total population was reduced from 73.5 % to 28.3 %. In the last inter-Census period, the process of urbanisation in Serbia stagnated. The growth rate was around 2 ‰, while the degree of urbanisation increased on 56.4 % (Central Serbia 56.3 %, Vojvodina 56.7 %). In that period, the urban population increased for 91.386 inhabitants, while the population of other settlements decreased for 161.000⁷ inhabitants. Consequently, the increase of urban population was slower than the reduction of the rural population (Tošić, D., 2000.).

6.2. Serbian urban settlements network

Contemporary Serbian urban settlements network, determined according to the Statistical Office of the Republic of Serbia, consists of 194 urban settlements: 114 in Central Serbia, 52 in Vojvodina and 26 in Kosovo and Metohija. As the last Census in 2002 did not register the inhabitants of Kosovo and Metohija, some of the basic demographic characteristics of 168 urban settlements in Central Serbia and Vojvodina will be presented here. Their significance for the regional organization of the Republic and its individual parts varies, as does their demographic size. Small urban settlements dominate in spatial structural and functional network organization. Out of 168 urban settlements, 51 have less than 5000 inhabitants, 41 from 5000 to 10.000, 58 range from 10.000 to 50.000, 14 settlements have from 50.000 to 100.000 inhabitants and only 4 have over 100.000 inhabitants (Belgrade with 1.118.980 inhabitants, Novi Sad with 190.602, Niš with 173.390 and Kragujevac with 145.890 inhabitants). There are 25 municipalities in Serbia (excluding Kosovo and Metohija) that have no urban settlements whatsoever⁸.

Table 9: Urban settlements distribution in Serbia⁹ according to demographic size by Census 2002.

Demographic size	Number of urban settlements	Population	Urban population	Position of Ljubljana
Up to 5.000 inhabitants	51	135.500	3.21	135.500
5.001-10.000	41	306.860	7.27	442.360
10.001-50.000	58	1.207.430	29.10	1.649.790
50.001-100.000	14	900.980	21.36	2.550.770
100.001-200.000	3	519.880	12.08	3.070.650
200.001 and more	1	1.118.980	26.53	4.189.630
Total	168	4.189.630	100	-

Source: Preliminary Census results in 2002, Statistical Office of the Republic of Serbia.

⁷ The methodology of the 2002. Census differs from the methodology of the previous 1991. Census. Data for 2002 refer to present population. During calculation of growth rate of urban population, the datum on the present population was also taken for 1991. Since the population of Kosovo and Metohija was not included by the last Census, there were not relevant indicators on the current situation of urbanisation of this part of Serbia.

⁸ Municipality centres without urban inhabitants have certain level of urbanity which is proportional to central function concentration in them.

⁹ In the table are presented results for the territory of Republic of Serbia without Kosovo and Metohija.

At first glance, it could be said that the urban settlement and nodal centre distribution in the Serbian urban network is favourable. However, more complex analyses of population concentration and functions in the urban settlements would open certain problems to argument. Belgrade is home to 26 % of urban population of Serbia (excluding Kosovo). The index of urban primacy of 5.87 points out its dominance (ratio of the population numbers of Belgrade and Novi Sad). Discord between the number of inhabitants of the leading settlement and other urban settlements shows that Serbia does not have a correct and uniformly developed urban system, i.e. that the urbanization flow had not been directed at the right time. If we were to critically analyze the justification of legal statistic criteria for determination of urban settlements, and apply a scientifically more justified model, as the Serbian geographers were calling for, we would find that a lower urbanization level of Republic of Serbia with the regional differences more visible and polarization even more pronounced.¹⁰

Table 10: Demographic size relation of the ten most numerous cities in Serbia, according to the Census 2002.

Urban settlement	Population	Index in relation to Belgrade	Index in relation to the previous city
Belgrade	1.118.980	1000	-
Novi Sad	190.162	0.169	0.169
Niš	173.390	0.154	0.911
Kragujevac	145.890	0.130	0.844
Subotica	99.471	0.088	0.676
Zrenjanin	79.545	0.071	0.957
Pančevo	76.110	0.068	0.955
Čačak	73.152	0.065	0.832
Smederevo	62.668	0.056	0.861
Valjevo	61.406	0.054	0.964

Source: Preliminary Census results in 2002, Statistical Office of the Republic of Serbia.

The size of the ten most numerous cities confirms the domination of Belgrade (1.118.980 inhabitants) or, rather, its urban agglomeration¹¹ as well as strong demographic polarization. The indexes shown lead to the conclusion that the concept of decentralized urbanization, regionally balanced and dynamically polycentric urban system, which was scientifically explained, incorporated in the Spatial Plan of Serbia of 1996 and socially justified, has not come to life.

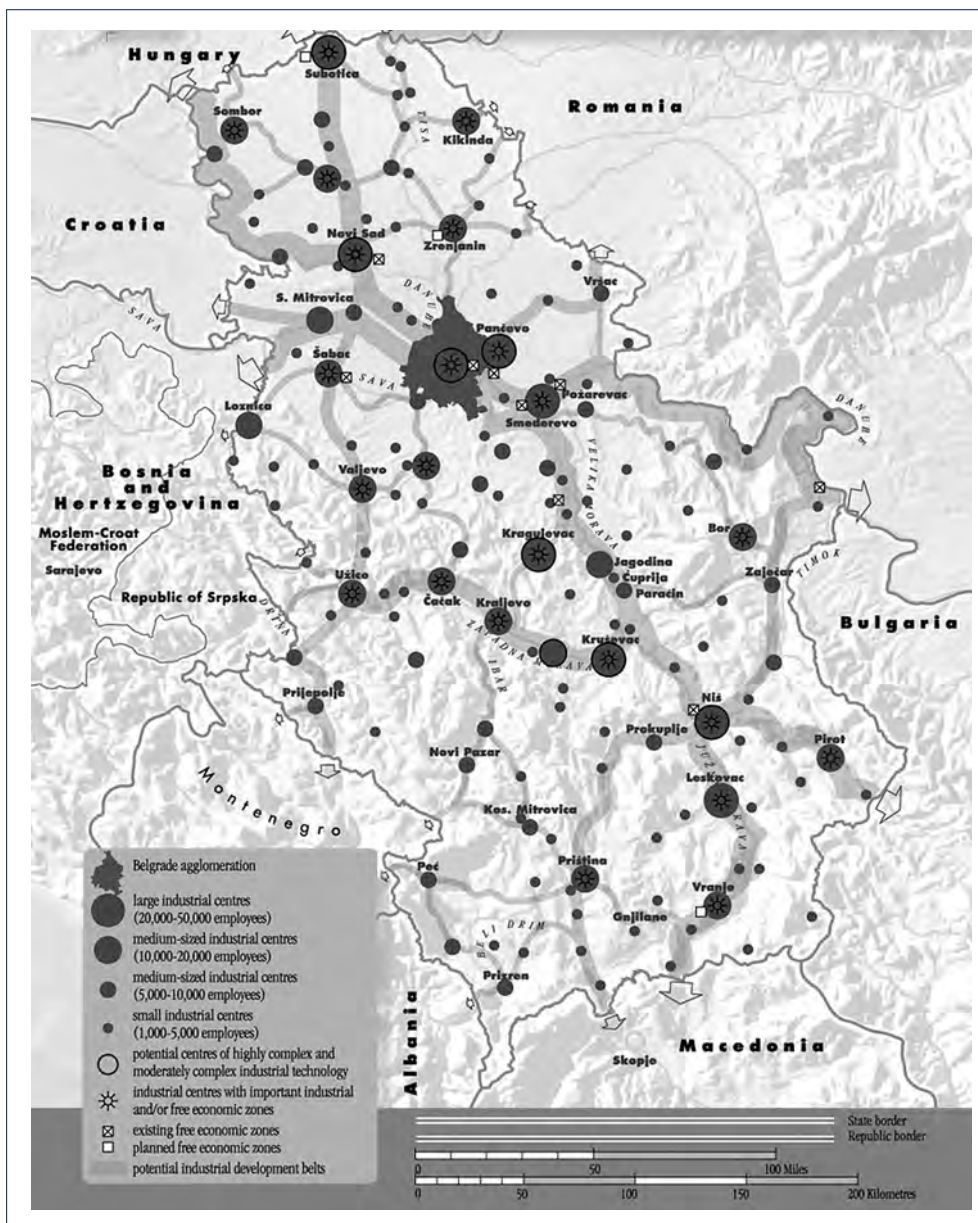
Polarization effects of urbanization, spatially manifested by demographic and economic-functional concentration, are also seen at the individual county level with the domination of their respective centres. Disproportion in demographic size of Belgrade and other larger cities is the result of incoherent and asymmetrical urban system of Serbia. There is an obvious absence of uniformly distributed urban settlements with 200.000 to 500.000

¹⁰ Criteria for character determination of settlements by Census 2002 have not been changed in relation to the previous two. Thus, some settlements that have a high level of urbanity, relatively high population concentration and good communal infrastructure are categorized as »others« and conversely, some of the settlements with low population concentration, undeveloped external factors and weak communal infrastructure are categorized as urban. Also, some of the settlements contained in larger urban agglomerations are categorized as rural, whereas at the same time, some of the smaller spa and tourist centres as well as mining towns are registered as urban settlements. There are several examples of this anomaly. Tourist centre Divčibare (223 inhabitants) has the status of an urban settlement, while Nova Pazova with 18.628 inhabitants has the status of a rural settlement.

¹¹ The City of Belgrade has 18 urban type settlements with a total of 1.280.639 inhabitants.

inhabitants, with macro regional functions, which would be the carriers of a balanced endogenous development of Serbia and links to integration of the Serbian urban system into the European urban system, so that, in time, it could participate more actively in the European development processes.

Figure 21: Belts of more intensive development in Serbia.



Source: *Spatial Plan of the Republic of Serbia, 1996, Government of the Republic of Serbia, Belgrade, Map 9.*

6.3. Analogy in hierarchy of urban centres and urban areas in Serbia

In Serbia has been established hierarchy of urban centres around which, on the basis of spatial and functional complementarities, has been formed their influential fields. On the hierarchical relations in the nodal centre and fields network influenced also their positions in communal and territorial-administrative organization of the Republic. Basically, developed are several forms of nodal centres and fields:

1. Smaller urban areas in rural environments have been developed by concentration of local population and functions in smaller municipal centres, which were transformed from commercial, trading and managing centres into urban type settlements with developed labour functions, thanks to industrial development. Until 1980s, they grew through migrations. Villages in the immediate surrounding were the most common migrant donors. They are also the centres of emigration because their functions were not sufficient to attract the population released from agriculture sector, which is why this population migrated to developed urban centres. Urban settlements with often more than 10.000 inhabitants belong to this type. They are the centres of local communal integration. Most of them do not have developed function thresholds, public or social infrastructure necessary for their rapid further development. Their future depends on their ability to diversify functions and participate in developing processes of their wider regional surrounding.

2. Smaller and larger urban settlement agglomerations, functionally networking with their suburbs and less urbanized periurban villages have the spatial structure that consists of cores of a higher nodal level and surrounding settlements that are functionally compatible to them. Up to the 1980s these functional cores had the role of growth poles and later on, they functioned as development poles. Namely, due to the lack of living space and insufficiently developed public, social, communal and technical- dwelling infrastructure in core areas, suburban villages become migrant destinations. That influences their demographic growth followed by an intensive dwelling construction and socio-economic transformation expressed with reduced share of agricultural inhabitants in overall and active population and increase of the households with non agricultural and mixed income. Since the functional transformation is mostly expressed in the settlements within these agglomerations, it is obvious that around their core zones start to form, more or less, continual periurban rings¹².

Functional core zones of the agglomerations had the activity structure of industrial and commercial centres. They began influencing social and geographical transformation and functional integration of their surroundings and creating smaller and larger functional urban areas and daily urban systems. Some of them, in certain cases, could grow into European type of functional urban areas. Most commonly they are municipal centres. In the Spatial Plan of Serbia they are defined as centres of functional areas as well¹³. Their future role is in functional integration of the territory of the Republic, although some of them have pre-dispositions to become cross-border regions (Užice, Šabac, Subotica, Kikinda, Vršac, Zaječar, Pirot, Vranje...).

¹² Periurban zones around our urban settlements are "conditionally" new spatial forms of settlements structures, emerged by morphological accreting and socio-economical transformation of suburban villages which by rule characterizes fast socio economical transformation processes, way of life, culture and population mentality... Planned approach in resolving spatial, urban, social, economical, infrastructural, ecological, cultural and similar, characteristically for them, problems and conflicts, most often overdue to the process of their development.

¹³ According to the Spatial Plan from 1996, Serbia is divided into 6 macro regions with 34 functional areas (8 in Vojvodina, 5 on Kosovo and Metohija and 21 in Central Serbia).

3. Complex regional functional urban systems consist of several settlements whose integrativity results from interactions between their structural elements, which are different type settlements and have different hierarchy. Their character is that of functional urban, i.e. metropolitan regions with high level of urbanity and high share of urban population in overall population, high rate of labour employment in non-agricultural activities, diversified functions and stable daily labour migration. The most significant representatives of this settlement type are Novi Sad, Niš, Kragujevac, Subotica... During the last decade, their functions are in constant recession. They need fundamental restructuring, primarily in the economic sector. They are potential centres of a uniform and balanced future development of the Republic of Serbia.

4. Belgrade agglomeration is a complex and dynamic system of urban settlements with high functional and morphological connectivity, clear multilevel hierarchy, large gravitation zone and cross-border range. It is a potential centre of South East Europe with first-rate international significance, i.e. the centre of the future Euro metropolitan region.

Numerous forms of more or less urbanized areas and regional urban systems have been identified in Serbia and their spatial and functional organization has been established. However, Serbia is insufficiently urbanized. Regarding to lasting continuity, differences are clearly visible between policentrically urbanized Vojvodina, less urbanized Central Serbia (with unsymmetrical hierarchy structure in urban settlements system and wide discrepancy between functional capacity of Belgrade and other centres) and low urbanized space of Kosovo and Metohija.

Although a great number of authors called for a polycentric and balanced development of urban settlements network, through papers dealing with urban processes and urban structures, such a concept has not been adopted in regional planning and regional development practice. It was only while Spatial plan of Republic of Serbia was being made that an exact analysis of all the elements and regional development factors was done. This analysis provided a base for demetropolization of Belgrade agglomeration, alleviation of disfunctionality in the settlement system and the beginning of functional balancing. (Derić, Atanacković, 2000). Major decentralization instruments for regional development are macro regional centres (Beograd, Niš, Kragujevac, Užice, Priština and Novi Sad), which would, according to the author's opinion, become centres of future regional cooperation with the surrounding South East Europe region.

Although the Spatial Plan was adopted 12 years ago, the questions of territorial competences, functional homogeneity, infrastructure connectivity and regional urban centres networking in Serbia remain open. It is obvious that 34 regional functional centres, 6 of which are macro regional centres, did not integrate Serbian geographic space sufficiently.

Serbian geographic space is relatively well covered with a network of cities. However, due to the great differences in their demographic size, quality, territorial reach, diversification of functions and scope of impacts, they don't have the same roles in regional integration of Serbia. Several forms of these have been identified: urban settlements with great significance in integration of the Republic of Serbia into international integration processes; urban settlements of great importance in integration of Serbian countries; urban settlements that are parts of internal development corridors and urban settlements with local integration role (Tošić, D., 2000.).

Belgrade, Novi Sad and Niš belong to the first group. Belgrade is the core of 2,5 million agglomeration developed as a nodal point of Panonia - Sava development axis (Vienna - Budapest - Belgrade - Bucharest), primary Balkan Morava - Vardar development axis (Belgrade - Niš - Skopje - Thessalonica - Athens), north Sava - Panonia axis (Jesenice - Ljubljana - Zagreb - Belgrade), south Sava axis (Novi Grad - Banja Luka - Bijeljina - Belgrade) and Šumadija - Ibar axis (Belgrade - Gornji Milanovac - Kraljevo - Kosovska Mitrovica - Priština - Skoplje). Belgrade agglomeration with its periphery represents foundation of Danubian - Sava development axis - part of the European development axis. In a Serbian scope, Belgrade metropolitan region is approaching to qualitative restructuring and decreasing demographic pressure directed toward its core zone. In a wider sense, Belgrade is the core of the 2,5 million agglomeration¹⁴. However, the role and significance of Belgrade in functional organization of SEE are determined by its role as a crossroad of multimodal European corridors X and VII. Future position and significance of Belgrade in a spatial and functional European organization will depend on the degree of valorization of its excellent geographic position, infrastructural equipment of the parts of the mentioned corridors that pass through Serbia and the ability and competitiveness of its industry to adapt and participate in European development processes.

There are 157 settlements within administrative borders of the City of Belgrade, of which 18 belong to the urban settlement type. Functionally, Belgrade agglomeration connects Vojvodina - Panonia - Danube area and middle Balkan part of Serbia (Tošić, 1996). It was developed by spatial integration of urban settlements along the Novi Sad - Zemun - Belgrade - Pančevo - Smederevo line. It also contains the secondary urban cores of Obrenovac, Lazarevac and Mladenovac. The City of Belgrade had, according to the Census 2002., 1.574.050 inhabitants, of which 1.280.639 or 82.3 % were in the urban settlements. At the same time, 1.118.980 inhabitants or 87.4 % of the urban population of the City live in the Belgrade settlement as a major urban centre.

For the past twenty years, Belgrade metropolitan region is stagnating in its development. To move from classic polycentric agglomeration with a strong core and weakly developed suburban centres to a modern polycentric agglomeration with suburban centres` taking over some of the functional and spatial competences of the core, it is necessary to develop a strategy according to the methodology of the European Union. Namely, former and present relations in the region are characterized by a distinct polarization and centre - periphery dichotomy. The Belgrade settlement has 12 times as many inhabitants as Obrenovac - Lazarevac - Mladenovac agglomeration subcentres, which needs to take over the role of regional development centre. To decentralization of functions has to be added also the decentralized policy of agglomeration development planning is as well as the decentralized policy of public and social services. This strategy must aim towards a clear objective - incorporation of Belgrade into the network of European cities. This can be achieved through improvement of communications and traffic infrastructure, qualitative transformation, improvement of the industrial, commercial and cultural sector competitiveness, and acceptance of the need for development of new economy and European ecological standards. According to the "Red Octopus" scenario, Belgrade

¹⁴ When spoken, 2,5 million agglomeration of Belgrade, we think about its European scope. The position of Novi Sad is important in that sense. In the future plans about Euro integration processes, Novi Sad and his agglomeration can be observed as a subsystem to Belgrade euro metropolitan region (3MEGAs), that is Belgrade European metropolitan region can be planned as a bipolar agglomeration Belgrade-Novı Sad. In favour of that go some arguments that Novi Sad should be treated as a core of secondary European metropolitan region, type PUSH (Potential Urban Strategic Horizon).

is intended to be a future technology development centre in the South and South East Europe in the rank of Rome, Madrid and Barcelona (Cattan, N., Saint-Julien, T., 1998.). The question: "where is the Belgrade metropolitan going?" was answered partly in the Regional Spatial Plan of the Administrative territory of the City of Belgrade. However the Regional Spatial Plan does not make a difference between metropolitan and administrative area of the City of Belgrade.

Belgrade's main complement in international integration processes are Niš and Novi Sad. The City of Niš has 250.180 inhabitants of which 177.823 are in urban areas (Niš and Niš Spa). If applying the socio-geographic method in determining frontiers of Niš agglomeration, one would see that Niš is the centre of a polycentric metropolitan region with 350.000 inhabitants and a large impact area. Its exceptional regional position is insufficiently valued. A very significant, but in Serbia insufficiently equipped by infrastructure the corridor starts from Niš and follows eastward to Sofia and further to the southeast towards Istanbul, while southwards the Morava - Vardar - Axios development axis continues, going to Athens through Skopje and Thessalonica (as part of the corridor X). Predispositions to become secondary complements to Niš has Vranje who received a certain functions of trans-border cooperation with settlements in Kumanovska and Skopska valley in Macedonia. Since these settlements have expressively polarization effects, the influences of Niš have to be redirected by planned action to population empty periphery, especially towards east and northeast. Towards northeast, a quality link could be established (Niš - Knjaževac - Zaječar) which would improve the quality of networking of Niš area with Timočka Krajina development axis and eastern Danubian area. Infrastructural improvement is also necessary in the corridor Niš - Prokuplje - Priština.

The second group of urban centres includes towns that played the significant roles in the trans-republic cooperation in the former country in the past, as well as the centres that have been the potential part of the trans-border cooperation of Serbia and neighbouring countries. In the settlement network of such character, distinguished are some centres that could be significant in the near future in initiating and developing the integration processes between Serbia and the Republic of Srpska, i.e. Bosnia and Herzegovina. Since the Spatial Plans of the Republic of Serbia and the Republic of Srpska have taken the development centres and development axis, i.e. the development corridors as the main instruments of the equal regional development and regional integration of geo-space, there is a question of the need of their coordination and coherency. The coordination of the developmental-integration processes in Serbia and the Republic of Srpska should be realized by the coordinating development of the urban centres - connections nodes that are functioning on the trans-border level. The development of two corridors is planned by the Spatial Plan of the Republic of Srpska: Posavina (Novi Grad - Prijedor - Banja Luka - Doboj - Brčko - Bjeljina) and Podrinje-Herzegovina (Bjeljina - Zvornik - Višegrad - Srbinje - Gacko - Bileća - Trebinje)¹⁵, while the development of several development corridors is planned by the Spatial Plan of the Republic of Serbia (Danube - Sava development belt, the Morava development axis, the Western-Morava axis of development, etc.)¹⁶. The Posavina development corridor of the Republic of Srpska is compatible with the Danube

¹⁵ Gnjjato gave the scientific basis for determining the functional significance of development corridors centres of the Republic of Srpska. See: Gnjjato, R. 1997: Nodalno-funkcionalna regionalizacija Republike Srpske. Glasnik Geografskog društva Republike Srpske, sveska 2., Banja Luka.

¹⁶ On the significance of development corridors or development axes in the functional organisation of Serbia, see: Tošić, D. 2000: Gradski centri-faktori regionalne integracije Srbije. Glasnik geografskog društva Republike Srpske, sveska 5., Banja Luka.

- Sava corridor in Serbia.¹⁷ It is interesting that the Spatial Plan of Serbia does not predict the Podrinje development axis, but the corridor which is analogue to it, going the line Novi Sad - Sremska Mitrovica - Šabac - Valjevo - Užice - Prijepolje¹⁸. According to the Spatial Plan of the Republic of Serbia, the areas that can participate in the integration processes with the Republic of Srpska are in the influential spheres of the macro-regional centres of Belgrade and Užice and in the functional areas¹⁹ of Sremska Mitrovica, Šabac, Loznica, Valjevo, Užice and Prijepolje. According to the Spatial Plan of the Republic of Srpska, the areas that have the potentials to networking with Serbia belong to the Doboј - Bjeljina and Sarajevo - Zvornik nodal region. With coherency and complementarity, with accomplished networking of urban centres and corridors of the Republic of Srpska and Serbia, the conditions would be made for the development of the broader regional association that would network the settlements of the central Balkans.

Including the urban centres into the processes of integration through the synchronised development of the complementary activities from the field of labour (complementary economy-coordinating production programmes and production capacities, rational use of natural and social resources, free labour movement, joint out of the market...), services and public-social infrastructure (trade, transport, health, education, information...) and ecology is necessary for establishing structurally the more qualitative inter-corridor connections.

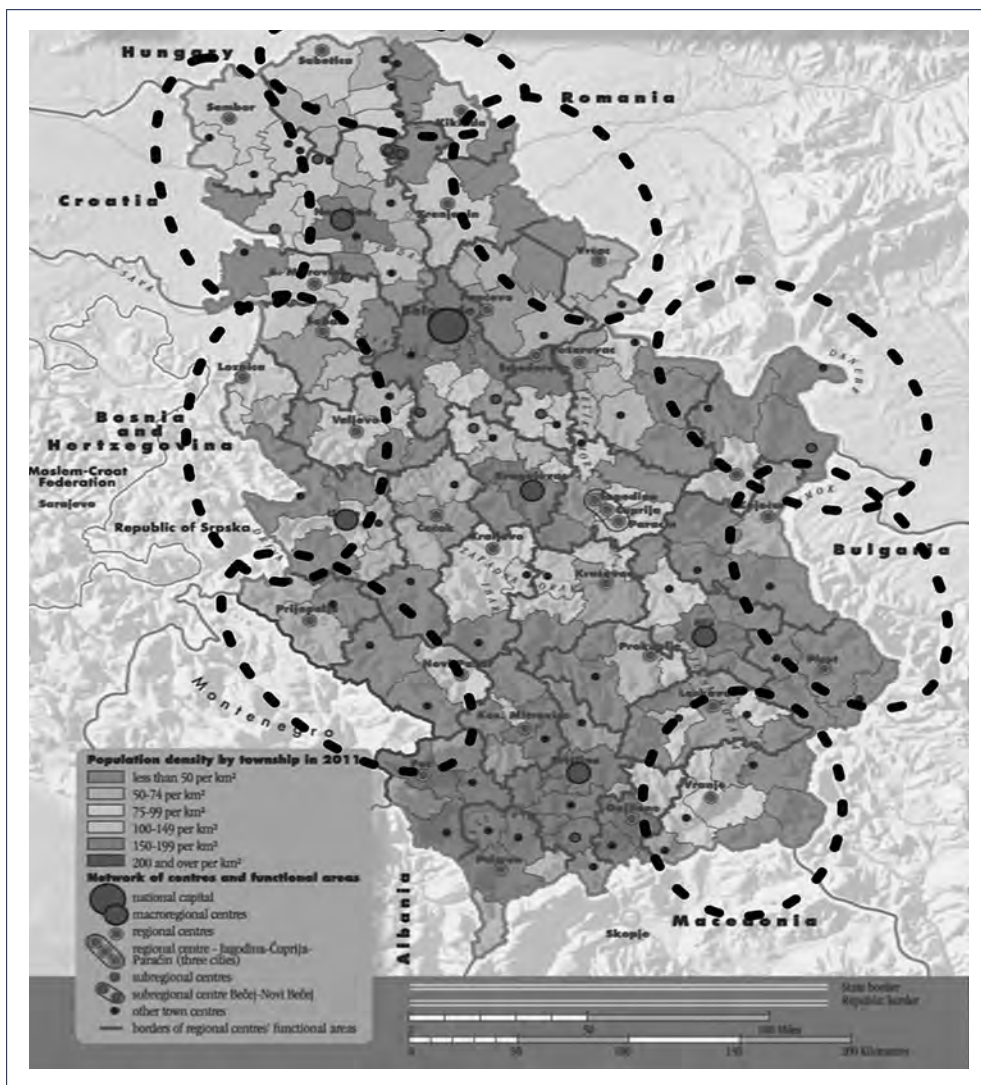
With an aim of more qualitative connection and trans-border cooperation among the population of two countries, the functional and infrastructural networking of the part of Podrinje in the Republic of Srpska, i.e. Bosnia and Herzegovina and the part of Podrinje in Serbia would be the main priority. Therefore, the emphasis is put on the development of the following lines: Užice - Višegrad; Foča - Pljevlja - Prijepolje; Prijepolje - Priboj - Višegrad; Priboj - Rudo - Cajnice; Bajina Bašta - Skelani - Srebrenica; Ljubovija - Bratunac - Srebrenica; Zvornik - Loznica - Valjevo; Bijeljina - Bogatić - Šabac; Bijeljina - Sremska Rača - Sremska Mitrovica; Bijeljina - Šid, etc. Užice and Loznica in Serbia and Višegrad, Zvornik and Bijeljina in the Republic of Srpska would be of the primary significance in the processes of strengthening the regional coherence and compactness, while the smaller centres which are in their spheres of influence would be of the secondary significance.

¹⁷ The Posavina development corridor of Republic of Srpska is the remnant of the Posavina corridor that existed in Social Federal Republic of Yugoslavia (SFRY) where Belgrade had the function of the dominant developing centre. In the Belgrade influential sphere, which was reduced by the disintegration of SFRY, in the time of its existence, were areas of Posavina in Bosnia and Herzegovina and in Croatia (large part of north-eastern Bosnia, Eastern Slavonia and Western Srem). The spatial-functional relations between Belgrade and Posavina in Republic of Srpska are still developing.

¹⁸ In the 1990s, there was an idea of Podrinje to be an axis of development that would integrate the parts of the Republic of Srpska and Serbia. See: Stepić, M. 1995: Podrinje-od pogranične regije do potencijalne osovine razvoja. Glasnik Srpskog geografskog društva, sveska LXXV, br.1. Beograd.

¹⁹ The term functional area was introduced into the Spatial Plan of the Republic; it is used as territorial group of several municipalities, connected with urban centre, i.e. regional centre. In the EU spatial planning practise, the term functional areas is defined as functional-urban regions.

Figure 22: Functional regions of Serbian urban centres; potential transborder region areas are delimited by dashed lines.



Source: Spatial Plan of the Republic of Serbia, 1996, Government of the Republic of Serbia, Belgrade, Map 8.

Other settlements, situated on the borders, also have the predispositions to participate in certain forms of the trans-border cooperation. Specially are emphasized: Subotica as the centre of the cooperation with the Hungarian settlements, Kikinda and Vršac as the bearers of the cooperation with Romania, Zaječar and Pirot as the centres of the cooperation between Serbia and Bulgaria, Vranje as the centre of the cooperation with Macedonia, Sremska Mitrovica, Bačka Palanka and Sombor as the centres of the cooperation with Croatia, etc.

Generally, all those settlements can be treated as the cores of the future transborder and transregional daily urban systems which, in the conditions of 'open' borders, are becoming the instruments of planning and realizing the trans-border cooperation in the area of economic and social development, culture, education, ecology, etc.

The third group of urban centres includes the urban settlements which make the parts of the development axes of Serbia²⁰. The axes of the development of Serbia have been represented by corridors of relations that connect the urban centres of different level of centrality, linear-polarisation agglomerations, concreted spatially. The primary development axes are the framework of the system - Podunavlje, Morava (Velika Morava and Južna Morava) and Zapadna Morava. The secondary axes of the development are more or less in the functional accordance with them. They are either differentiated insufficiently or equipped bad by infrastructure. In the network of development axes of the primary and secondary level, some geo-spatial wholes, in which the development-stimulating effect is weak, have been turned into demographic and economic depressions. They are most expressed in the eastern and south-eastern border and mountain parts of the Republic. The weakly developed centres of the local urban concentration have existed there.

The Podunavlje development axis of Serbia is mentioned in planned documents as the Danube-Sava development belt. The Danube - Sava development belt was formed on the basis of many spatial-functional interactions resulted from merging and complementing of the two basic macro-regions of Serbia: the Panonian - Podunavlje and the Middle-Balkan. That is the conditionally homogeneous physiognomic region (consisted of four sub-wholes: the Posavina and the Pannonian, Djerdap and Wallach-Pontian Podunavlje), but functionally, it is the most significant development-integrative axis of the Serbian geo-space, i.e. the functional region with complex structure, differentiated by the functional-gravitation relations of the centres that it connects (Apatin, Sombor, Bačka Palanka, Novi Sad, Sremska Mitrovica, Šabac, inner core of Belgrade agglomeration, Pančevo, Smederevo, Požarevac, Veliko Gradište, Golubac, Kladovo). The centres within this axis where the lines of communications cross the traffic corridors are of a special significance. In the part of Vojvodina, the traffic corridors diverge radially from Novi Sad in the north towards Subotica and in the east towards Zrenjanin. The network of traffic corridors and centres integrates the area of Vojvodina relatively well, but the traffic isolation of the settlements is visible in northern Banat. The secondary Timok development axis joins the belt in the eastern part of the Republic, connecting Kladovo, Negotin, Zaječar and Knjaževac. The Belgrade metropolitan has the dominant position in the Danube-Sava development belt.

The Morava development axis integrates the functional zones and gravitation areas of Smederevo, Požarevac, three towns (Jagodina, Čuprija, Paraćin), Niš, Leskovac and Vranje. In the part of the Velika Morava axis, the impacts of Kragujevac as the most developed urban centre of south Šumadija are felt. In the part of the Južna Morava axis, its development impacts do not almost reach the local urban centres of Gornja Toplica, Jablanica, Vlasina, Krajište and Pčinj, the settlements of which have been in the continuous demographic exodus.

²⁰ Djurić pointed out the significance of development axes in the regional organisation of Serbia by calling them functional wreaths (Djurić, 1970). Perišić defined them as linear agglomeration systems (Perišić, 1985); Radovanović established high degree of coordination of their stretching direction with the natural-traffic stretching (Radovanović, 1993-1994); Veljković gave them their original meaning of corridor of connection among poles and centres of growth and development (Veljković, 1995).

The Zapadna Morava development axis represents the linear-polarisation functional-regional whole which divides the geo-space of Serbia on northern and southern parts. It connects several urban centres (Užice, Sevojno, Požega, Lučani, Čačak, Kraljevo, Trsternik, Vrnjačka Banja, Kruševac and Stalać). Its sphere of influence includes: the Užice Region, Moravica, Dragačevo, Aleksandrovac and southern parts of Šumadija. The Zapadna Morava and the Ibar development axes of Serbia are connected in Kraljevo. The infra-structural facilities do not follow the spatial-functional significance of the axis. It does not have traffic propulsion. The Zapadna Morava urban centres are connected with Belgrade, i.e. the Sava - Danube development belt by railroads Požega - Belgrade and Kraljevo - Kragujevac - Belgrade. The Zapadna Morava urban settlements used to represent the immigration membrane which kept from immigration from Kosovo and Metohija towards Belgrade.

The significant role in the functional organisation of Serbia have also the centres situated in the parts that are out of the axes of development, such as Kragujevac, Valjevo, Novi Pazar, etc. In contrast to the urban centres, the integral parts of the development axes, the influences of which have linear spreading, the development impulses from the mentioned towns have radial spreading. The most acceptable model of their further development is the model of Polycentric Integration Areas (PIAs). They are, basically, the polycentric urban systems of the sub regional characters, organised according to the principles of "decentralized concentration".

Observing the network of growth and development axes and the centres they connect, their low density in the geo-space of Kosovo and Metohija can be noticed. Demographic and functional domination have been present there, as well as weak functional development of Kosovska Mitrovica, Prizren and Peć. The status of Kosovo and Metohija in the previous country (SFRY) contributed to a great extent to it.

The fourth group of urban settlements includes the centres of local urban concentration which do not have the developed functions to influence the organisation of the regional encirclement. They are developed in the mountain parts of Serbia or in its inner valleys. They are mono-functional and isolated and they have problems while coordinating their local development aspirations with the regional development flows. The examples of such settlements are the settlements of Babušnica, Lebane, Bosilegrad, Krupanj, Ljubovija, Tutin, Sjenica, etc.

The urban system of Serbia is neither compatible nor coherent with the aims of the formation of the European urban system. The urban systems of the European Union are characterised by high degrees of centralisation and expressed hierarchy, so the final goal of its developmental policy is the creation of the optimally structured polycentric net of cities. The functional specialization of smaller towns or their agglomerations is also significant. As the future European strategy is directed towards the polycentric urban structures, so the basic goal of Serbia is to adapt its planning to that concept.

According to the share of urban population (56 %), Serbia represents weakly urbanised area in relation to Europe as a continent and European Union, but according to the degree of urbanisation, it is on the level of the South-eastern European countries. The process of urban transition in the Serbian geo-space was intensified by the middle of the 20th century. It was developing in the conditions of industrialization and it had the

polarisation character. That brought to the development of the urban net which was characterised by the regional differentiation, the (in)compatibility of its parts, asymmetry and more often the territorial disconnection and isolation.

According to the spatial-functional structure, Serbia is a complex, dynamic and heterogeneous territorial system. The basis of its modern urban net consists of urban settlement - the poles and centres of growth and development and the functional corridors by which they are connected. The complex relationship of hierarchy was established among the urban settlements and the corridors established between them (Belgrade metropolitan, macro-regional centres, centres of functional areas, centres of local urban concentration). That caused the considerable regional differences in concentration and development of urban settlements and urban population.

The imperatives of further development of the net of urban centres of Serbia are the dynamics and spatial and developmental stability. That can be achieved by permanent decentralization of urbanisation. Only high degree of urbanity of regional wholes of the Republic guarantees its territorial, functional and economic compactness.

7. Demographic characteristics and processes in Ljubljana

Dejan Rebernik

The city of Ljubljana and its urban region experienced very dynamic population growth after 1945. Up until the 1970s, population growth was mainly a consequence of intensive migration from rural and less developed areas of Slovenia and the rest of Yugoslavia. Immigrants provided the labor force needed for the rapidly growing manufacturing and services sectors. Characteristic was concentration of population in Ljubljana as well as in other, smaller towns in the region. At the same time a positive natural increase is also characteristic of this period, which together with a positive migration increase contributes to the growth in population. In the 1980s and 1990s the relocation of the population to suburban settlements at the edge of the city intensified. In this way the largest suburbanized area in Slovenia, with around 150.000 inhabitants, took form. The city centre and older areas of housing experienced depopulation. The natural increase declined due to a drop in fertility and in 1996 Ljubljana recorded a negative natural increase for the first time. After 1991 the Ljubljana urban region experienced rapid economic development, which attracted new migration flows. The region has the highest migration balance of all the Slovenian regions. In the same period, due to negative natural and migration growth, the number of inhabitants in Ljubljana itself decreased.

The main objective of this chapter is to present the major characteristics of population development in Ljubljana and the Ljubljana urban region. Population development is placed and explained in the context of general demographic and urbanization processes in Slovenia. We attempted to determine to what extent the growth in population is a consequence of migration trends or natural increase. Special attention is given to particular parts of the city of Ljubljana and the urban region and to the latest urbanization and demographic processes. In the second part of the chapter we give greater attention to an overview of the demographic characteristics of Ljubljana, with an emphasis on the age structure of the population. Population development and demographic characteristics have a great influence on the spatial development of the city and urban region; we therefore highlight the problem of spatial planning in a situation in which the population is both declining and aging.

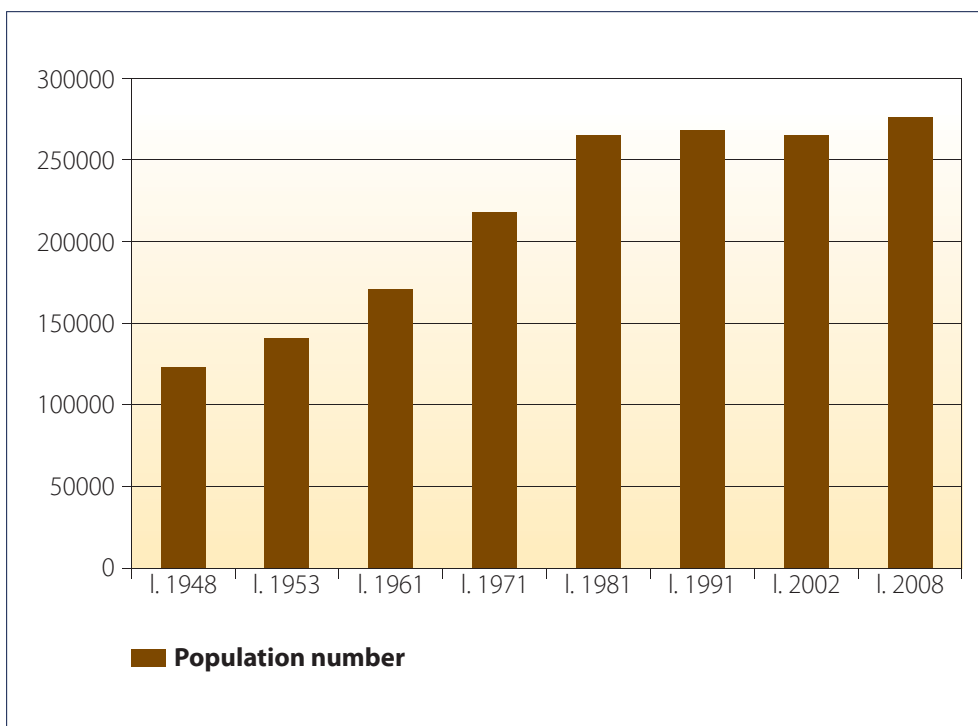
7.1. Population development and demographic characteristics of Ljubljana and the Ljubljana urban region before 1991

The current size, spatial distribution and demographic characteristics of the population in Ljubljana and the Ljubljana urban region are primarily the result of migration flows which occurred in Slovenia and in the former Yugoslavia after 1945. Although a relatively low degree of urbanization is still typical for Slovenia, with only slightly more than 50 %

of the population living in urban areas, during the first postwar period up to the end of the 1970s, the country was characterized by accelerated urbanization, which was fueled mainly by strong migration of the population from the countryside (Ravbar, 1994). The population immigrated from Slovenian rural areas and a large part, about one third, came from migrants from regions in the former Yugoslavia. Besides Ljubljana some larger urban settlements within the urban region also grew quickly, in particular Domžale, Vrhnika, Litija and Grosuplje.

The population of the present-day territory of the Urban Municipality of Ljubljana increased from approximately 120.000 to approximately 270.000 from 1948 to 1991, or by about 120 % (Figure 23). The rate of population growth after 1945 increased steadily and achieved a peak between 1961 and 1981. After 1981 population growth slowed considerably, and at the end of the 1980s it began to stagnate. The causes for this kind of population development can be found in demographic, urbanization, and socio-economic processes which took place in Slovenia during the period studied (Rebernik, 1999). Compared to other European countries, Slovenia is characterized by a relatively low level of urbanization, with just a bit over 50 % of the population living in urban areas. Nevertheless, rapid urbanization characterized the 1950s, 1960s, and 1970s: the share of the urban population increased from 26 % in 1948 to 36 % in 1961, 45 % in 1971 and 49 % in 1981. Urbanization was mainly a consequence of the abandonment of farming, industrialization, and the migration of population into cities from rural areas of Slovenia and the rest of Yugoslavia. The population grew most rapidly in major regional centres and highly industrial cities. In the 1970s the fastest growth was shown by towns in the urbanized environs of Ljubljana, Maribor, and Celje. Here it should be stressed that urbanization in Slovenia was less pronounced than in other Yugoslav republics. The relatively weak urbanization in Slovenia was a result mainly of commuting by the labor force from rural settlements to urban centres of employment and the initiation of a policy of polycentric economic and urban development. Polycentrism in Slovenia became the basic concept of spatial development in the 1970s and 1980s. The development of industry and services in smaller urban and rural settlements and in less developed parts of Slovenia was actively encouraged. Access to jobs in the countryside slowed the rural-urban migration. In comparison with other major cities in the republics of the former Yugoslavia, the growth of Ljubljana was considerably slower. In 1948 about 8 % of the population lived in Ljubljana, and in 2007 about 13 %, which is a considerably smaller share than in the cases of Belgrade, Zagreb, Sarajevo and Skopje.

Figure 23: Population development in the territory of the Urban Municipality of Ljubljana between 1945 and 2009²¹.



Source: Statistical office of the Republic of Slovenia.

After 1981 a slower growth of the urban population can be observed. While the population in the majority of cities continued to grow, in the 1980s for the first time there was a drop in population in some cities. Large cities in the more urbanized regions lost population, while towns in less urbanized parts of the country continued to grow. It is thus clear that classical urbanization, i.e. the process of concentration of the population in cities, changed to the suburbanization of the more densely populated areas in the wider vicinity of larger towns and cities (Ravbar, 1994). In the 1980s, the highest rate of growth of the population occurred in settlements on the outskirts of major regional centres, due to the outmigration of the urban population. In the 1990s the processes mentioned further intensified. The total number of inhabitants in cities declined, most noticeably in major centres. The share of the population living in urban settlements thus declined by 1 % between 1996 and 2002. At the same time there was a continuation and intensification in the deconcentration of the population into surrounding suburbanized areas. In the first half of the 1990s population growth was most rapid in suburbanized settlements at the city's edge, but between 1996 and 2002 small rural settlements with good access to major urban centres had the most rapid growth. Thus in the most recent period there has been an urbanization process in the broader hinterland of urban regions.

²¹ Data are recalculated according to the methodology of the 2002 Census for the territory of the present-day Urban Municipality of Ljubljana.

Tables 11 and 12 show the total, natural, and migration growth of the population for particular years, which enables a more detailed analysis of population development in Ljubljana. Data for the period between 1945 and 1964 were accessible for the area of the city of Ljubljana as defined by the Statistical Agency at that time—the settlement of Ljubljana and selected settlements along its edge (Mauser, 1970). For the period between 1965 and 1993 data were collected for five Ljubljana municipalities (Center, Bežigrad, Moste, Šiška and Vič-Rudnik), which now comprise the Administrative Unit of Ljubljana and thus include a considerably wider area. For this reason data from the two periods are not directly comparable, but they nevertheless make possible the identification of basic trends in the demographic development of Ljubljana. The spatial extent of Ljubljana municipalities is not the most suitable for our analysis, since it also includes entirely rural settlements in the municipality of Vič-Rudnik and also partially in the municipality of Moste, while it does not include the urbanized settlements in the municipalities of Domžale, Vrhnika and Grosuplje, which are closely connected to Ljubljana. Despite some deficiencies, the data cited are nonetheless a sufficiently good indicator of basic trends in population development in the territory of Ljubljana and its urban region.

A more detailed view of population development shows that the annual growth of the population fluctuated greatly. The annual growth in the territory of the city of Ljubljana between 1945 and 1964 ranged between 2000 and 6000 inhabitants, with an average of 3500 to 4000. The rate of population growth reached a value of between 2-3 %, greatly surpassing the value for the whole of Slovenia as well as the values for urban settlements. Between 1965 and 1980 the annual growth in the territory of the five Ljubljana municipalities at the time was between 5000 and 7000 inhabitants, or 2-2.5 %. After 1980 there was a sharp drop, and in 1991 and 1992 it was even negative (Rebernik, 1999).

Population growth in cities is the result of the natural increase of the urban population and immigration into the city. We were interested in finding out what proportion of the annual population growth in Ljubljana and its environs was contributed by natural increase and what proportion was due to immigration or rather the migration balance. In Ljubljana up until 1981, with the exceptions of the periods 1945-1946 and 1950-1953, much of the population growth was the result of immigration into the city: more than two-thirds of the increase can be attributed to a positive migration balance. Between 1945 and 1964, 46,779 people moved into the city of Ljubljana, whereas only 26,628 people were born there. Between 1965 and 1980, 57,198 people moved into the territory of the five Ljubljana municipalities, while 41,171 were born there. This is evidence that the principal cause of the rapid growth of population between 1945 and 1980 is migration of population from rural areas to the city, but also that the share of natural increase in the total growth gradually increased. Thus in the 1970s the annual natural increase already reached the level of the migration balance and after 1979 it exceeded it. Between 1980 and 1993, of the total growth of 18,462 inhabitants, only 409 inhabitants were due to migration trends (Rebernik, 1999). Here we should note that immigration, particularly from republics of the former Yugoslavia, was also present after 1980. But at the same time there began intensive emigration by the urban population to surrounding settlements, which in 1989 for the first time exceeded immigration. Thus there were two processes simultaneously at work in the 1980s: suburbanization of the areas adjacent to the city of Ljubljana, with the emigration of the urban population, and "classic" urbanization with the immigration of population from less developed regions of Slovenia and the former Yugoslavia.

Almost the entire growth in population after 1981 was thus the result of the natural increase of the urban population, since immigration and emigration flows were roughly equivalent. The natural increase of the population also underwent considerable changes in the postwar period. We can explain its dynamics by means of general demographic trends in Slovenia and with the specific age and family structure of the population of Ljubljana. Between 1946 and 1954 the natural increase was between 1.2 and 1.4 %. In the next decade it dropped to about 0.6 to 0.9 % annually. Up until 1982 the rate of natural increase maintained similar values and became very stable and considerably higher than the average for Slovenia, since there was a steady flow of younger immigrants into the city who then had families. After 1982, with changed migration trends and consequently a changed age and family structure of the population, the natural increase also dropped sharply (Rebernik, 1999).

The large role played by immigration in the population growth of Ljubljana in the first decades after the Second World War is shown by data on the share of the immigrant population in the total population of the city. In 1991 46.5 % of the population of the Urban Municipality of Ljubljana were immigrants. With respect to origin, most were from other municipalities in Slovenia (63 %), followed by immigrants from the republics of the former Yugoslavia (32 %). Two-thirds of the immigrants in this period thus came from Slovenia and one-third, or almost 40.000 people, from the other republics of the former Yugoslavia, for the most part from Serbia, Bosnia and Herzegovina, and to a lesser extent from Kosovo, Macedonia and Montenegro.

Table 11: Total, natural, and migration increase of the population of Ljubljana²² between 1945 and 1964.

	Total increase	Total growth per 1000 inhabitants	Natural increase	Natural increase per 1000 inhabitants	Migration increase	Migration increase per 1000 inhabitants
1945	3145	28.4	-252	-2.3	3397	30.7
1946	3145	27.6	1652	14.5	1493	13.1
1947	3143	26.8	1547	13.2	1596	13.6
1948	4648	38.6	1536	12.7	3112	25.9
1949	4477	35.9	1607	12.9	2870	23
1950	3571	27.6	1914	14.8	1657	12.8
1951	3032	22.7	1674	12.7	1358	10.2
1952	2050	15.3	1774	13.1	276	2
1953	2646	19.2	1646	12	1000	7.2
1954	3192	22.7	1403	10	1789	12.7
1955	3844	26.7	1367	9.5	2477	17.2
1956	4098	27.8	1066	7.3	3032	20.5
1957	3912	25.7	1000	6.5	2912	19.2
1958	2559	22.8	890	5.7	1669	17.1
1959	2749	17.3	1088	6.9	1661	10.4
1960	3754	23.1	1013	6.2	2741	16.9
1961	4615	27.8	1093	6.6	3522	21.2
1962	3517	20.6	1423	8.3	2094	12.3
1963	5934	34.1	1604	9.2	4330	24.9
1964	5376	29.8	1583	8.7	3793	21.1

Source: Statistical Office of the Republic of Slovenia.

²² Data are based on the territory of the city of Ljubljana as defined by the then Agency of Statistics—the settlement of Ljubljana and selected settlements at the city's outskirts (Mauser, 1970)

Table 12: Total, natural, and migration increase of the population in the territory of the Administrative Unit of Ljubljana²³ between 1965 and 1994.

	Total increase	Total growth per 1000 inhabitants	Natural increase	Natural increase per 1000 inhabitants	Migration increase	Migration increase per 1000 inhabitants
1965	6401	28.6	2311	10.32	4090	18.26
1966	7130	30.9	2295	9.96	4835	20.98
1967	6747	28.4	2219	9.34	4528	19.06
1968	5582	24.8	2148	8.79	3434	14.06
1969	6021	24.1	2214	8.86	3807	15.24
1970	5704	22.3	2172	8.49	3532	13.8
1971	5117	19.6	2506	9.58	2611	9.98
1972	5625	21.1	2521	9.45	3104	11.64
1973	4989	18.3	2293	8.42	2696	9.9
1974	5290	19.1	2400	8.65	2890	10.42
1975	5915	20.1	3352	11.86	2563	9.07
1976	7248	25.1	2700	9.36	4548	15.76
1977	7089	23.9	2592	8.76	4497	15.2
1978	6381	21.1	2796	9.23	3585	11.84
1979	6680	22.2	2857	9.24	3823	12.36
1980	6450	20.4	3795	12.01	2655	8.4
1981	3180	9.9	2445	7.58	735	2.28
1982	3516	10.8	2597	7.98	919	2.82
1983	2104	6.4	1753	5.33	351	1.07
1984	2109	6.1	1749	5.28	270	0.82
1985	1987	5.9	1559	4.68	428	1.28
1986	1961	5.8	1615	4.82	346	1.03
1987	2257	6.7	1458	4.32	799	2.37
1988	1836	5.4	1380	4.07	456	1.34
1989	643	1.9	1331	3.9	-488	-2.02
1990	477	1.4	956	2.8	-479	-1.4
1991	-974	-2.8	690	2.03	-1664	-4.89
1992	-699	-2.0	423	1.24	-1122	-3.3
1993	65	0.2	207	0.61	-142	-0.42
1994	331	1.0	165	0.5	176	0.5

Source: Statistical Office of the Republic of Slovenia.

Population development in the rest of the territory of the present-day Ljubljana Urban Region was much slower in the period up to 1971 than in Ljubljana. The exceptions are smaller satellite towns and urbanized settlements in the broader vicinity of Ljubljana, particularly Domžale, Vrhnika, Medvode, Litija and Grosuplje. After 1971 population growth intensified in the narrower suburbanized outskirts of Ljubljana, especially in the northern and western edge settlements, due to strongly increased immigration. In the decade between 1981 and 1991, due to suburbanization and emigration of population from Ljubljana, the settlements in the narrow suburbanized belt around Ljubljana, especially in the northern part between Ljubljana, Domžale and Kamnik, and the area at

²³ The Administrative Unit of Ljubljana comprises five former Ljubljana municipalities.

the northern edge of Ljubljana Marsh (Ljubljansko barje), experienced extremely high growth in population. Settlements in the suburban belt around Ljubljana grew by 20 to 60 % between 1981 and 1991 (Ravbar, 1994). In this way the largest suburbanized region in Slovenia took shape around Ljubljana. In 1991 it comprised a third of the territory of the present-day Ljubljana urban region with around 150.000 residents.

Thus three characteristic forms of settlement took shape in the region: cities (Ljubljana and satellite towns), suburbanized and densely settled regions in the immediate gravitational hinterland of Ljubljana, and less densely settled rural areas. Characteristic of the areas of suburbanization is dispersed individual housing construction, made possible by the liberal and relatively inexpensive purchase of lands and the low costs of municipal infrastructure. Under socialism individual construction represented the only possibility for investing savings since other forms of investment were not possible. The increase in car ownership and better transportation access made commuting possible, since employment was concentrated in towns. The basic reasons and conditions for the rise of suburbanization in Slovenia in the 1970s and 1980s were: a shortage of housing and very high prices of apartments and land in cities in conjunction with relatively low prices of land and municipal services at the outskirts of cities and towns, the desire to live in one-family houses, a better quality living environment, investment of savings in housing construction, the rise of private car ownership, the construction of roads and resultant improved traffic access to settlements in the vicinity of cities, and ineffective urban planning and regulation (Rebernik, 2004).

7.2. Population development and demographic characteristics of Ljubljana and the Ljubljana urban region after 1991

The Ljubljana urban region still remained an area of population immigration after 1991. Table 13 shows that the region over the last ten years has had a positive migration balance, especially after 2005. Slovenia as a whole is characterized by relatively weak inter-regional population migrations, but the Ljubljana urban region shows the highest migration balance. It is interesting that a large part of the immigrant population is from outside the country, which indicates an intensification of immigration to Slovenia after a sharp drop at the beginning of the 1990s, particularly in the Ljubljana urban region. Among foreign immigrants, citizens of Bosnia and Herzegovina, Serbia, Macedonia, and Croatia predominate. Immigration is associated mainly with employment, since the Ljubljana urban region has the fastest growth and most diverse structure of jobs and the most favorable economic development trends. In this connection it should be stressed that the actual extent of immigration is considerably greater, since many people, especially those with Slovenian citizenship, do not register their change of permanent residence. In contrast to Slovenia, the region throughout the period studied also showed a positive natural increase, on average between 1 and 2 per 1000 inhabitants. This is primarily the result of a more favorable age structure of the population in the region, which is the result of the immigration of younger and middle younger generations from the rest of Slovenia and from abroad. Between 1991 and 2007 the number of inhabitants in the territory of the Ljubljana urban region thus increased from 460.000 to more than 500.000, or by more than 10 %.

Table 13: Total, natural, and migration increase of the population in the territory of the Ljubljana urban region and Slovenia between 1996 and 2007.

	Total increase LUR / per 1000 inh.		Total increase SLO / per 1000 inh.		Natural increase LUR / per 1000 inh.		Natural increase SLO / per 1000 inh.		Migration increase LUR / per 1000 inh.		Migration increase SLO / per 1000 inh.	
1996	528	1,0	691	0,3	534	1,1	168	0,1	-6	-0,0	697	0,3
1997	438	0,9	-477	-0,2	527	1,1	-763	-0,4	-89	-0,2	286	0,1
1998	-518	-1,0	-3288	-1,6	404	0,8	-1183	-0,6	-922	-1,8	-2105	-1,1
1999	1175	2,3	983	-0,5	576	1,2	-1352	-0,6	599	1,2	2335	1,2
2000	1586	3,2	2207	1,1	728	1,5	-408	-0,2	858	1,7	2615	1,3
2001	1877	3,7	1961	1,0	445	0,9	-1031	-0,5	1432	2,8	2992	1,5
2002	1163	2,3	665	0,3	558	1,1	-1200	-0,6	605	1,2	1865	0,9
2003	1609	3,2	1282	0,6	280	0,6	-2130	-1,1	1329	2,7	3412	1,7
2004	1972	3,9	1340	0,7	698	1,4	-562	-0,3	1274	2,6	1902	0,9
2005	3303	6,6	5768	2,8	813	1,6	-668	-0,3	2490	5,0	6436	3,2
2006	3787	7,5	7019	3,5	1193	2,4	752	0,4	2594	5,2	6267	3,1
2007	6111	12,2	15489	7,7	1549	3,1	1239	0,6	4562	9,1	14250	7,1

Source: Statistical Office of the Republic of Slovenia.

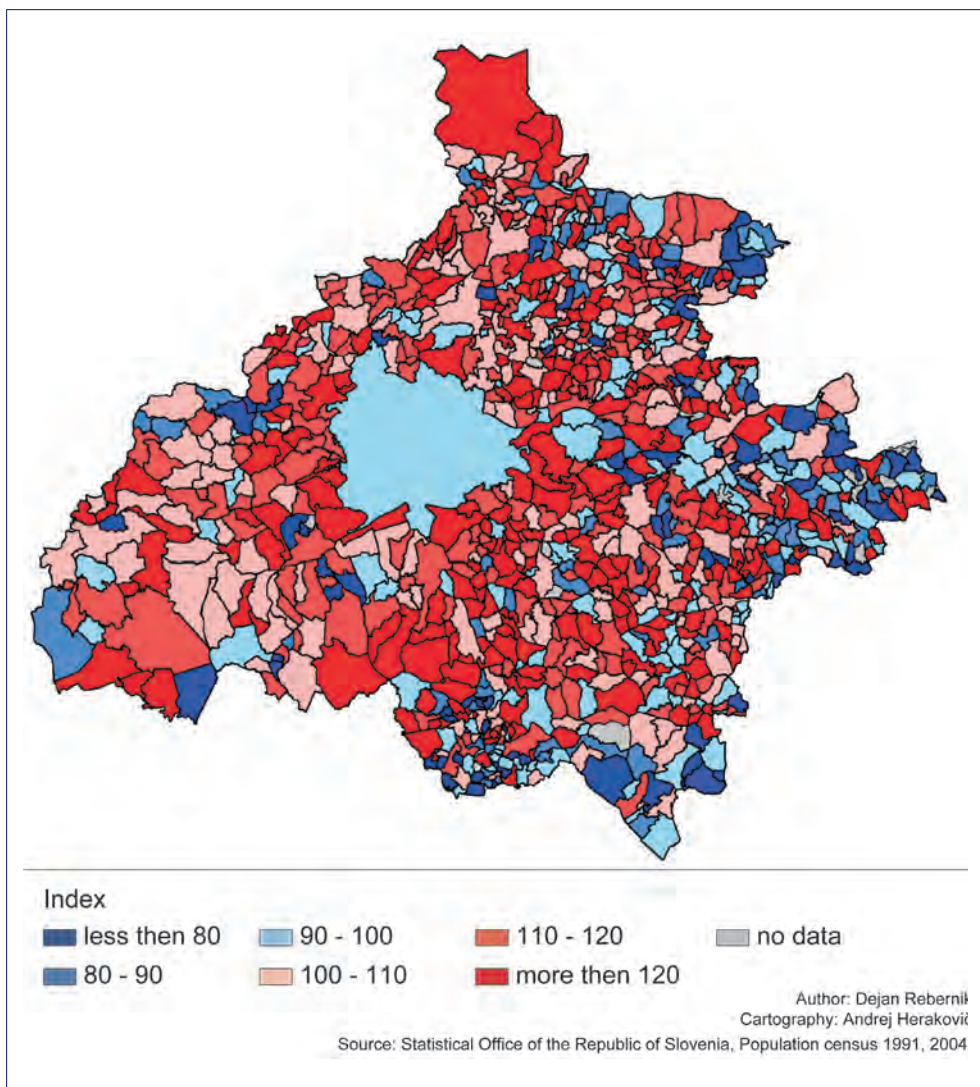
Table 14: Population development in the Ljubljana urban region (LUR) between 1991 and 2007.

Municipality	1991	2002	2007	1991/2002	2002/2007	1991/2002
LUR	463802	488364	506829	105,30	103,78	109,28
Ljubljana	268120	265881	267920	99,16	100,77	99,93
Other municipalities	192155	217754	235005	113,32	107,92	122,30
Borovnica	3527	3839	3904	108,85	101,69	110,69
Brezovica	7667	9334	10179	121,74	109,05	132,76
Dobrepolje	3328	3544	3727	106,49	105,16	111,99
Dobrova-Polhov Gradec	5740	6691	7071	116,57	105,68	123,19
Dol pri Ljubljani	3695	4341	5011	117,48	115,43	135,62
Domžale	26523	29902	32410	112,74	108,39	122,20
Grosuplje	13195	15665	17853	118,72	113,97	135,30
Horjul	2398	2622	2729	109,34	104,08	113,80
Ig	4447	4555	6030	102,43	132,38	135,60
Ivančna Gorica	11928	13567	14519	113,74	107,02	121,72
Kamnik	24461	26477	28033	108,24	105,88	114,60
Komenda	3957	4451	4826	112,48	108,43	121,96
Litija ²⁴	18242	19120	19886	104,81	104,01	109,01
Logatec	9665	11343	12298	117,36	108,42	127,24
Lukovica	4288	4972	5273	115,95	106,05	122,97
Medvode	12541	14161	14793	112,92	104,46	117,96
Mengeš	6073	6662	6927	109,70	103,98	114,06
Moravče	4008	4508	4794	112,48	106,34	119,61
Škofljica	5051	7119	8028	140,94	112,77	158,94
Trzin	2592	3385	3664	130,59	108,24	141,36
Velike Lašče	3271	3735	4087	114,19	109,42	124,95
Vodice	3456	3871	4262	112,01	110,10	123,32
Vrhnika	15629	17729	18605	113,44	104,94	119,04

Source: Statistical Office of the Republic of Slovenia.

²⁴ Due to the split of the Municipality of Litija the data on the population for the year 2007 represent the municipalities Litija and Šmartno pri Litiji.

Figure 24: Population development in the Ljubljana urban region by municipality between 1991 and 2007.



Source: Statistical Office of the Republic of Slovenia.

After 1991 there were some important changes in the trends and distribution of the population. For the first time there was a drop in the population in the area of the city of Ljubljana as a whole. While the population of Ljubljana grew by 11.000, or 4 %, between 1991 and 2002 the number of inhabitants fell by 9000, from 267.000 to 258.000, a decrease of 3.5 %. The decline in population, which in the 1980s was characteristic only for the city centre and some of the oldest suburbs, thus intensified and expanded to other parts of the city. A decline in population thus remains characteristic for the majority of

the city centre, the older suburbs and the older apartment block neighborhoods, which up until 1991 were characterized by population growth (Rebernik, 2004). For the Urban Municipality of Ljubljana negative migration and natural growth and consequently a decline in the total population was characteristic up until 2004. Due to the shortage and high prices of apartments a large part of the younger generation of Ljubljana residents who moved out of their parents' homes solved their housing problem by building a house or buying an apartment in one of the municipalities in urban region. The emigration of population from Ljubljana to the suburbanized settlements intensified after 2000: the municipality of Ljubljana has a negative migration balance with all the other municipalities in the urban region. The annual negative migration balance of the Urban Municipality of Ljubljana with all the other municipalities in the urban region is between 1000 and 2000 people.

In the second half of the 1990s and at the beginning of the new century the fastest population growth was typically shown by smaller rural settlements in the Ljubljana urban region. In comparison with the period between 1981 and 1991, the area of population growth thus expanded spatially from the narrower and more densely settled suburban areas to include rural areas in the region as well. New settlement in the countryside was extremely dispersed, frequently outside or at the edge of existing rural settlements. The phenomenon has all the characteristics of the process of "urban sprawl." It consists entirely of new construction in the form of one-family houses, most often "individual do-it-yourself building." New construction is located separately or in small groups. As part of this process a transformation of settlements of vacation homes into settlements with permanent residence was also characteristic, as for instance in the case of the settlement of Rakitna. Parents thus moved into former vacation homes and left their apartments in Ljubljana to their children. This kind of development was encouraged by a shortage and high prices of apartments and building land in Ljubljana and also in suburbanized areas. We can thus conclude that in the Ljubljana urban region suburbanization is moving into the phase of peri-urbanization, exurbanization, or "expanded" suburbanization, for which the movement of the population from densely settled and compact urban and suburban parts of the region to sparsely settled and dispersed rural areas is characteristic. In this way the region has passed into a new phase of the urbanization cycle (Rebernik, 2004).

After 2005 there are some important changes in Ljubljana population migration trends. For the first time in a long time the migration growth of Ljubljana is positive, due particularly to strong immigration from abroad, and the drop in the total population is halted. A very large increase in migration growth is particularly evident after the year 2007, exceeding 2500 persons in Ljubljana and 6500 persons in the Ljubljana urban region. Due to the short time period we cannot say whether this is a long-term trend in the growth of immigration from abroad into the city of Ljubljana and its urban region. Over a longer period there is also, similar to the situation for Slovenia as a whole, a positive natural increase in the population. Based on the data we can conclude that in the period after 1991 there is a simultaneous process of deconcentration of the population within the urban region in the form of suburbanization, and a continuation of population immigration from abroad to the city of Ljubljana. Trends over the last three years indicate a strong increase in immigration into the Ljubljana urban region and renewed growth in the population within the Urban Municipality of Ljubljana.

Table 15: Total, natural, and migration increase in the population of the Urban Municipality of Ljubljana²⁵ between 1995 and 2007.

	Total increase	Total increase per 1000 inh.	Natural increase	Natural increase per 1000 inh.	Migration increase	Migration increase per 1000 inh.	Migration increase from abroad	Migration increase between municipalities
1995	-1175	-4,4	48	0,2	-1223	-4,5	0	-1223
1996	-1331	-4,9	-51	-0,2	-1280	-4,8	166	-1466
1997	-1653	-6,0	-38	-0,1	-1615	-5,8	72	-1687
1998	-1992	-7,3	-119	-0,4	-1873	-6,9	52	-1925
1999	-2085	-7,7	-287	-1,1	-1798	-6,6	135	-1933
2000	-1091	-4,0	30	0,1	-1121	-4,1	809	-1930
2001	-463	-1,7	-161	0,6	-302	-1,1	1113	-1415
2002	-1803	-6,7	-92	-0,3	-1711	-6,4	-91	-1620
2003	1665	-6,2	-230	-0,9	-1435	-5,4	-9	-1426
2004	-366	-1,4	-3	-0,0	-363	-1,4	982	-1345
2005	198	0,7	101	0,4	97	0,4	1610	-1513
2006	204	0,8	159	0,6	45	0,2	1479	-1434
2007	1783	6,6	394	1,5	1389	5,2	2656	-1267

Source: Statistical Office of the Republic of Slovenia.

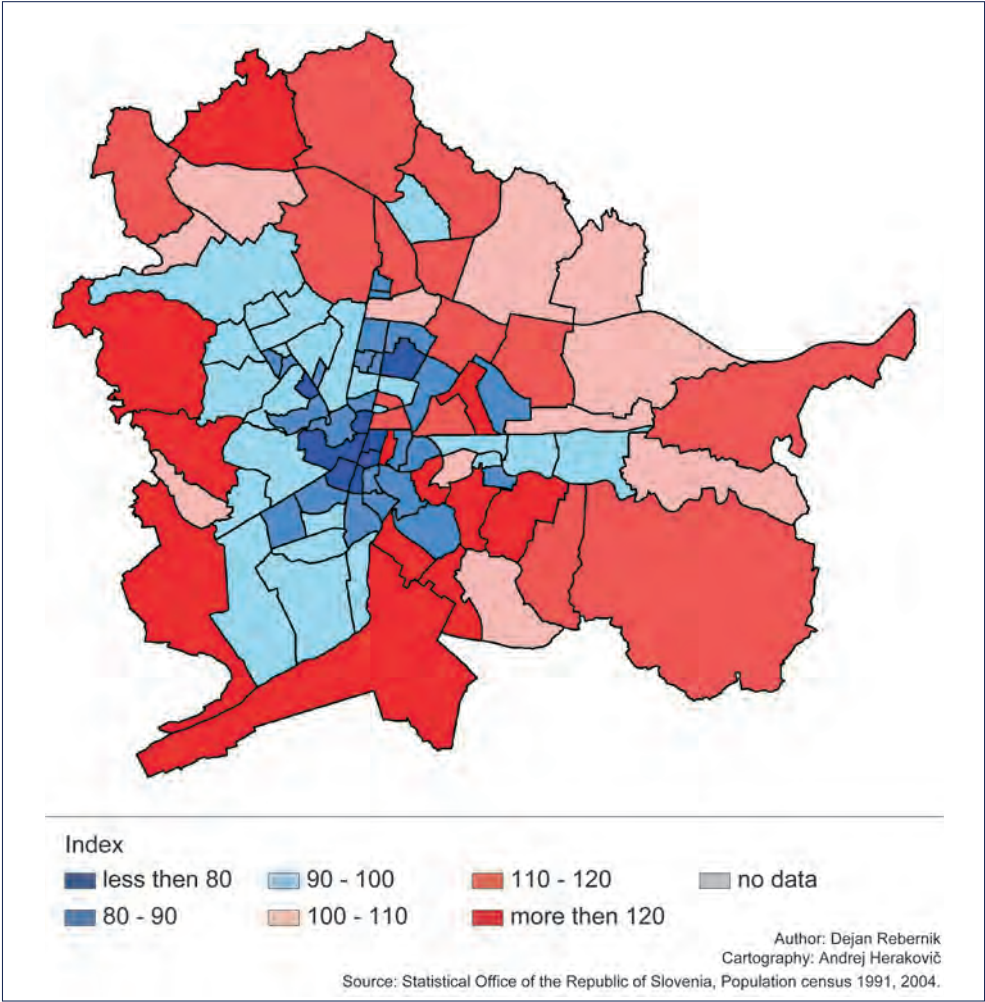
Migration within the city has had an important influence on changes in the number and structure of inhabitants in particular parts of the city. Compared to other European cities of comparable size, the migration mobility of the population within the city is relatively weak: in 1998 there were only 45 moves per 1000 inhabitants. Between 1995 and 1999 there were thus 31.770 moves recorded in Ljubljana (Dolenc, 2000). In the last decade, with the liberalization of the real estate market and renewed intensification of housing construction, we could observe a trend of increasing residential mobility of the urban population. Moves are most commonly connected with changes in the family situation of people, as for example marriage, births, deaths, or adult children leaving home. In this connection Ljubljana has shown a characteristic increase in the number of households despite a drop in the number of the population. Average household size thus fell from 2.71 members in 1991 to 2.59 members in 2002. This process has stimulated demand for housing, which despite the drop in population still remains quite strong.

Against the general decline or stagnation in population in the Urban Municipality of Ljubljana, there are large differences among individual parts of the city with respect to population development. Figure 25 shows the development in the number of inhabitants between 1991 and 2002 in the former local communities. A sharp drop in the number of inhabitants in the central part of the city and growth along the whole of the city edge can be observed. Strong decline in population numbers is characteristic in particular for most of the city centre and the older residential neighborhoods, especially in the apartment block neighborhoods that were built between the 1950s and 1980s. A high share of elderly population and households with an older middle generation of parents and "adult children" is characteristic for these parts of the city. Young adults are in the phase of creating their own families and looking for housing. When they move out

²⁵ The Urban Municipality of Ljubljana was established in 1995 after the reform of local self-management in Slovenia

from their parents' homes, the number of inhabitants in these parts of the city is reduced, but at the same time a great demand for housing is created despite the stagnation in the total number of people. Due to the shortage and high cost of housing, a large part of this population moves outside Ljubljana, most often into neighboring municipalities. On the other hand the population is growing in parts of the city with intensive housing construction, for example along most of the city's edge as well as in smaller sections in the central part of the city (Tabor, Poljane, Mostec, parts of Bežigrad). New construction and renovation of housing areas in the city centre and at its edge entered an upswing especially after 1995. Given the general shortage of building lots, the high demand for housing, and the high prices of real estate, housing construction in the central part of the city also attracted private investors. New apartments in prime locations attract residents with above average incomes, such that particular parts of Ljubljana as for instance Tabor, Poljane, parts of Old Ljubljana, and Zelena jama have experienced re-urbanization and gentrification.

Figure 25: Population development in Ljubljana between 1991 and 2002.



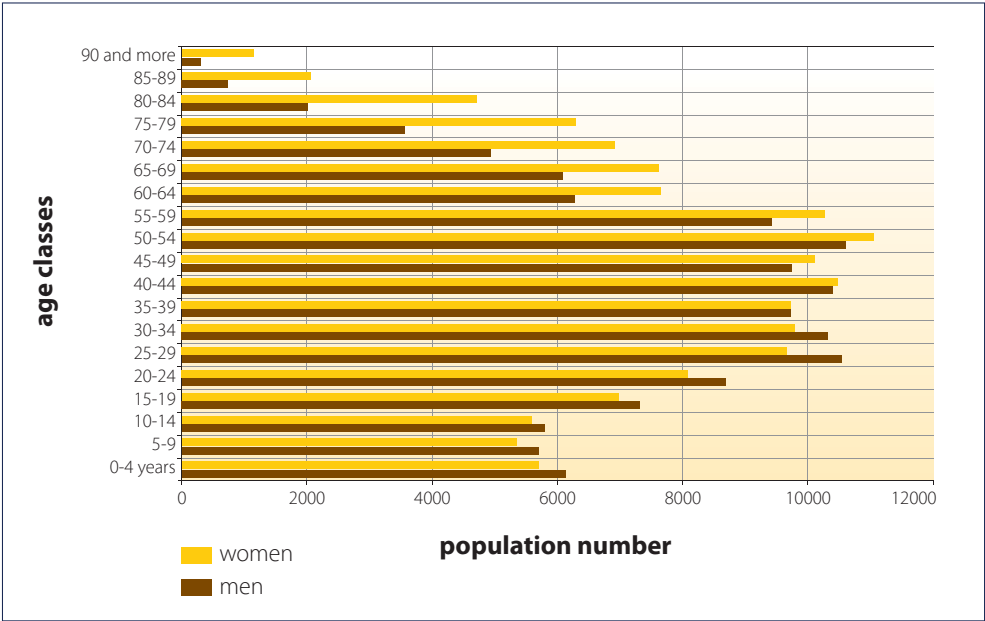
Source: 2002 Population Census, Statistical Office of the Republic of Slovenia.

7.3. Demographic characteristics and future population development of Ljubljana

One of the most important structures of the population for future demographic development as well as due to its social and economic significance is the age structure of the population. The age structure of the population is shown by the number or share of particular age groups, and is thus an indicator of the needs for public services, such as kindergartens, schools, retirement homes and health care as well as an indicator of the economic potential and human capital. The current age structure is the result of demographic development over a longer time period; it is a “mirror” of past demographic characteristics. The continued long-term development of the population is to a large degree determined by the age structure. The age structure of the population is thus the basis for making demographic projections. Below we analyze the basic demographic characteristics and future population development for the case of Ljubljana and the Ljubljana urban region based on the age structure of the population.

The age structure of the population of Ljubljana has a pronounced “lightbulb” shape, which is an indicator of an older demographic regime. Ljubljana does not differ significantly in its age structure from the majority of urban areas in central Europe. There is a high share of population in middle age, particularly age groups between 40 and 59, and a low share of children up to the age of 15, as confirmed by a high index of aging (135, compared to 116 in Slovenia as a whole). This situation is a consequence of the relatively high fertility and positive natural increase in the 1950s, 1960s, and 1970s (the so-called “baby boom” generation) and a sharp drop in fertility and consequently negative natural increase from the 1980s onward. A very low share of children is of course also a function of migration trends, particularly the emigration of the younger generation, who are starting families, to the other municipalities in the urban region. Due to a low number of women in their fertile years we can predict that the number of children born in the coming decades will be small or at any rate lower than today, even if there is a possible increase in fertility. On this basis we can expect a negative natural increase in Ljubljana in the next two decades. The only factor which can influence a higher number of births is a strong influx of members of the younger generation through immigration, who would start their families in Ljubljana. Based on the present-day age structure of the population we can thus with high certainty predict a further increase in the number and share of the middle-aged and especially the older generation, which will have a great influence on the social, economic, and spatial development of the city.

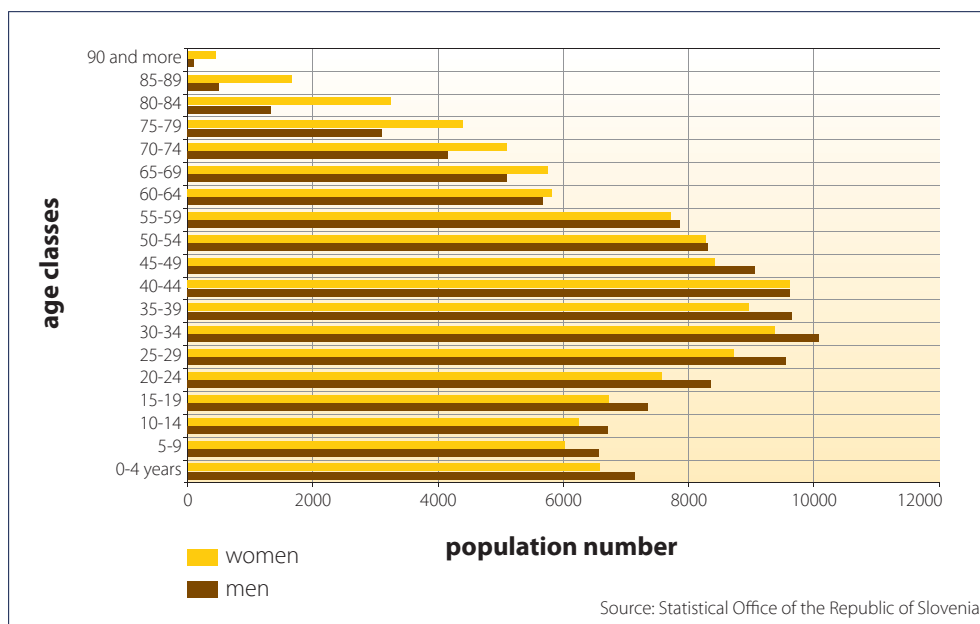
Figure 26: Age structure of the population in the Urban Municipality of Ljubljana, as of 30 June 2006.



Source: Statistical Office of the Republic of Slovenia.

The age structure of the population in the Ljubljana urban region is much more favorable than that of the Urban Municipality of Ljubljana. There is a noticeably higher share of the younger middle generation and children, i.e. young families with children, and a lower share of the elderly population. This is confirmed by a very low index of aging (70). This kind of age structure is a consequence of suburbanization and the migration of the younger population, particularly younger families with children, from Ljubljana to the outlying municipalities. Large differences in the age structure of the population between the city and its outskirts are a general feature of European urban regions. In the case of the Ljubljana urban region this represents a great challenge to spatial planning, especially for the suitable distribution of public services and jobs with respect to the numbers of people in particular age cohorts. Thus in many municipalities at the city outskirts there is a lack of places in kindergartens and primary schools while in Ljubljana school capacities are too large, even as vacancies in retirement and nursing homes are too few. The migration of the active working-age population to the edge of the urban region and a concomitant concentration of jobs in Ljubljana cause an intensification of commuting (Ravbar, 2002).

Figure 27: Age structure of the population in the Ljubljana urban region not including the Urban Municipality of Ljubljana, as of 30 June 2006.



Source: Statistical Office of the Republic of Slovenia.

7.4. Conclusions

Population development of Ljubljana during the period of classic urbanization, which is driven by rural-urban migration, up until the end of the 1980s was characterized by steady population growth. In the 1980s the city of Ljubljana experienced stagnation and later a drop in population as a result of suburbanization. The focal points for population concentration have shifted to the edge of the urban region, where the population is continuing to grow. Demographic development is marked by a gradual aging of the population. The demographic characteristics and processes noted have a great influence on the economic, social and spatial development of Ljubljana. In conclusion we would like to highlight the changed position and role of spatial planning in conditions of demographic regression or stagnation. New demographic conditions require new approaches in spatial and urban planning. Spatial planning to date has been based in particular on assumptions of constant population growth. In the case of demographic stagnation, which is also characteristic of Ljubljana, the basic guidelines for the continued spatial development of the city need to be set differently. A good example of this is the planning of areas of housing construction in Ljubljana. Despite the drop in the number of inhabitants, there is still high demand for housing in Ljubljana. The Urban Planning Institute has estimated the housing deficit in Ljubljana up until the year 2015 to be 15,000 apartments (Rebernik, 2007). Housing construction has again intensified after a cessation at the beginning of the 1990s, such that in recent years it has reached a level of about 1000 newly constructed apartments per year, but this is not sufficient to cover the deficit. Here the question arises as to why housing demand remains high even in

conditions of demographic contraction. Slovenian geographer Jakoš (Jakoš, 2006) notes the phenomenon of the “demographic housing deficit”, which he explains as a housing shortage which arises as a result of specific demographic characteristics and processes. The main factor behind housing demand is thus no longer population growth but rather the emergence of new households due to the younger generation moving out of the homes of middle-aged parents. Due to the specific age structure of the population this phenomenon in Ljubljana is especially intensive. At the same time there is a large imbalance between the existing structure and housing demand. The increase in the number of elderly people, who have specific residential and social needs, calls for new approaches and solutions (retirement and nursing homes, assisted living facilities, home care). All this places numerous new challenges before spatial planning.

8. Demogeographic characteristics and processes in Belgrade

Gordana Vojković, Mirjana Devedžić

The position and role of Belgrade in the regional development of Serbia is closely correlated with the changes of its geopolitical position in the past and the significance it has as within the Serbian, so within the area of South-Eastern Europe. The best indicator is its development from the periphery urban nucleus, over the significant urban centre, to the nodal centre of wide field of influence even out of the state borders (Stojanović, B. 1999). Belgrade, very soon, distinguished itself in the geo-space of Serbia by its developmental influence (but also by its strong polarisation effect), which resulted in intensive population concentration and rapid spatial-structural changes. In a short period of time of the second half of the 20th century, the region of Belgrade grew into the complex functionally urban system of urban and rural settlements, with expansive demographic growth, making thus much unevenness both in the regional and demographic development of Serbia.

The main characteristic of the demographic development of Belgrade during the second half of the 20th century was a constant and expressive population growth, which very soon brought to the formation of the special pole of demographic concentration in Serbia²⁶. The process of urbanisation in Serbia was followed by the general rural exodus and the population concentration, starting from the local municipal centres to the primary centres of the development, but during that process, Belgrade played the dominant and key role, generating large disproportions in the geo-space of Serbia. The scope of the migrations, directed towards Belgrade, speaks on its strong polarisation influence and attractive strength which was much larger in relation to the power of attraction of other regional centres in Serbia. For instance, in the process of immigration, in which almost 2.6 million persons participated by the 1990s, the Belgrade settlement (inner city area) assimilated 41.1 % of the total immigration on the area of central Serbia²⁷. The strong and elemental migration from the areas of Serbia (as well as from other republics of the former Yugoslavia) and its directing to the area of Belgrade agglomeration, have shown all the strength of its influence in the wider encirclement, so that nowadays, in any sense, this urban area dominates the whole area of Serbia.

In the period from 1948 to 2002, the population of Belgrade increased for two and a half times (index 249) from 634.000 to 1.576.123²⁸. The growth of Belgrade agglomeration

²⁶ During the second half of the 20th century, it came to the clear differentiation of the space in regard of the population dynamics between central Serbia and Vojvodina and Kosovo and Metohia. Thus, except Belgrade, the area of Kosovo and Metohia was singled out as the second pole of the population growth and concentration in Serbia. As the consequence of maintaining the high rates of the increase, in some inter-census intervals, the population increased even up to three times faster in Kosovo and Metohia than the population of central Serbia and almost five times faster than in Vojvodina. It should be emphasized that the factors of the expansive growth of these areas were completely different. While in Belgrade, the migration component was the main determinant of the demographic growth, in Kosovo and Metohia, the high natural increase of the population, in the conditions of the constant population emigration, was the decisive factor of the population growth.

²⁷ By comparison, the share of other regional centres of central Serbia was tenfold smaller: Niš 5.9 %, Kragujevac 4.8 %, while less than 2 % in other centres (Vojković, 2007).

²⁸ We meet two data on the population of Belgrade in statistical sources. Namely, the 2002 census was carried out according to the new, changed methodology, in accordance with the international recommendations, which means different definition...

was faster than the population increase of Serbia, which caused the constant growth in the proportion of Belgrade population in the total population of Serbia. According to the 1948 census data, 9.7 % of the republic population lived within the borders of the present-day urban region (the City of Belgrade), while by the 2002 it increased to over 16 %. Nowadays, according to the estimation for 2007, the City is administratively divided into 17 municipalities with 157 settlements and the population of 1.7 million⁴.

8.1. Short review on the population development of Belgrade by the middle of the 20th century

The beginning of the 19th century is the period of extremely hard and unsettled circumstances in Serbia. The constant changes in the political, economic, social and cultural living conditions, in the atmosphere of insecurity due to frequent uprisings and wars, "imbued the Belgrade population with the feeling of the temporary stay and residence in the town of Belgrade, which was particularly reflected on the way of living and general living standard of Belgrade residents: in the appearance of the houses built quickly and in the way of their construction as the temporary residences" (Stojancević, V., 1974). The descriptions of the Belgrade town of that time speak of it as "neglected and considerably damaged settlement" (Čubrilović, V., 1974). By the strengthening of the Serbian state, Belgrade began to develop rapidly, so that in the last decade of the 19th century it already got its modern shape. By the independence of Serbia in 1878, Belgrade took over the role of the leading political and urban centre in the newly formed state, attracting immigrants from various regions. Every extension of the state territory contributed to the expansion of its influence and it was followed by the spatial and demographic expansion of the city. By the creation of the Kingdom of the Serbs, Croats and Slavs, Belgrade became the centre of the state of the three times larger territory and as many inhabitants, so that the period from 1918 to 1931 has been considered as one of the most dynamic in the (demographic) development of Belgrade. By the strengthening of its political, economic, social, cultural and educational functions, its sphere of influence was appreciably enlarged, the consequence of which was the permanent huge influx of immigrants, dynamic population increase and changes in all structures of the population. Although migrations had a decisive role on the city growth, with the strengthening of the demographic base, the significance of the natural component of the demographic growth also increased.

The demographic growth of Belgrade⁵ can be followed starting from the first census

²⁸ ... of the total population. In dependence on the choice of the methodology in applying the census data, and with the aim of comparing with the previous censuses, the picture on the population number of Serbia, as well as of Belgrade is changed. According to the methodology of the previous censuses, the population number of Belgrade would be 1.638.643 in 2002.

²⁹ Source: Statistical yearbook of Belgrade 2007

³⁰ The traces of the Celtic, Thracian and Neolithic settlements speak on the long settling history of this area. Even in the early classical period, Belgrade appeared as the urban settlement. After the change of the Roman and Byzantine epochs, there had not been the trace of the city up to the 9th century, when thereafter it appeared under its Serbian name. Idrizi, in his geography from 1153, wrote about Belgrade as of thriving and well settled town. In the Middle Ages, Belgrade was twice the Serbian capital city, but thereafter it passed into Hungarian hands, while it remained under Turkish rule from 1521 to the beginning of the 19th century. The historical sources testified on many changes of the ethnical picture and demographic size of Belgrade. Thus, for example, the sources from the second half of the 16th century pointed to the existence of the large and thriving city with around 6.000 houses, which could also mean over 30.000 inhabitants; from the second half of the 17th century, Belgrade was mentioned with 17.000 houses and nearly 100.000 inhabitants; while the 1717 census, after the Austrian occupation, pointed to the population change, recording only 924 families with around 4.620 inhabitants (More about it: Radovanović, 1999; Radovanović, 1974).

in the Principality of Serbia in 1834. The official census datum showed that Belgrade had 7033 inhabitants, but the real number was certainly larger, because the census did not include the total population (the Turks and the Gipsies were omitted). In 1846 already, the population was doubled (14.371), while according to the census of 1866, which has been taken as the first census in the modern sense, there were 24.768 inhabitants. By the end of the 19th century, in 1890, 54.249 inhabitants lived in the city. Nevertheless, in relation to the dynamic demographic growth that would come after in the 20th century, the population growth during the 19th century was temperate. By the 1921 the population of the city was doubled again (on 111.739), while ten years needed to pass for the next doubling. According to the former territory of the city and its absorbent powers, it could be said that Belgrade was exposed to the strong demographic pressure - the greatest one of its whole history. In only 10 years, in the period from 1921 to 1930, the population grew for 117.376, whereof 14.800 by the natural and over 103.500 (87 %) by the mechanical increase (Bogavac, T. 1991). In the population census of 1931, 238.775 inhabitants were recorded. The period of World War II halted the dynamic demographic and urban growth, but soon after that, the city reached the pre-war population number. Before the census of 1953, the population from the 1930s doubled and reached almost half a million (477.982).

8.2. Demographic development of Belgrade in the second half of the 20th century

The demographic development of Belgrade cannot be observed separately from its spatial functional development and territorial expansion. With the expansion of the sphere of influence, its administrative borders also expanded and the changes in the administrative-territorial organisation of the city and its inner surroundings are frequent. At the end of the 19th century and the beginning of the 20th, the central area of the City included 12 km² and the population of 1900 was 69.700. The former Belgrade district, as the part of the future urban region of Belgrade, comprised the area of 2025 km² with 126.100 residents. By the middle of the 20th century, during the census of 1953, there were 731.800 residents on the same area (treated administratively as Belgrade administrative district). The administrative area of Belgrade expanded, practically, to the scopes of the present-day borders, to 3222 km², which is 3.6 % of the total area of the Republic of Serbia, just due to the dynamic demographic and urban development in the time of the 1971 census. That was the time when Belgrade grew into a large city - by 1.200.000 inhabitants, it concentrated 14.3 % of the population of Serbia. The migration flows influenced such intensive growth, but also the expansion of the urban zone and the new settlements joining into the administrative area of the city, because exactly in those parts of the City, the immigration flows were the strongest and the spatial-functional changes were large. The effects of joining are best illustrated by the datum that the share of inhabitants of newly joined settlements was 41 % of the total demographic growth of the Belgrade settlement (Rančić, M. 1984).

By the 1970s, the inner city area (the Belgrade settlement) had more dynamic population growth in relation to the total territory of the City of Belgrade - in the period of the highest increase of the 1960s, the population grew on average for even 24.000 persons

³¹ More about it: Stojanović, B. 1999.

per annum. During those years, the inner city area was providing even 90 % of the total growth of the Belgrade population. During that period of time, many settlements from its direct hinterland and suburban municipalities were losing their population due to their migration to Belgrade.

Table 16: Changes in the population number of Belgrade, 1948 - 2002.

	Population number								
	According methodology of previous censuses							Methodology 2002	
	1948	1953	1961	1971	1981	1991	2002	1991	2002
Serbia	6527966	6979154	7642227	8446591	9313676	9778991	7893125*	7576837*	7498001*
City of Belgrad	634003	731837	942190	1209360	1470073	1602226	1638643	1552151	1576124
Inner City	397711	477982	657362	899094	1087915	1168454	1163602	1133146	1119642
Other area	236292	253855	285428	310266	382158	433772	475041	419005	456482
	Index of population change								
	According methodology of previous census							Methodology 2002	
	1953/48	1961/53	1971/61	1981/71	1991/81	2002/91	2002/48	2002/1991	
Serbia	106.9	109.5	110.5	110.3	105.0	-*	-*	99,0*	
City of Belgrad	115,4	128.7	128.4	121,6	109,0	102,3	258,5	101,5	
Inner City	120,2	137,5	136,8	121,0	107,4	99,6	292,6	98,8	
Other area	107.4	112.4	108.7	123.2	113.5	109.5	88.2	108.9	

Note: * without data for Kosovo and Metohia.

Source: Population Census of 2002.

In the next period, from 1980s, the demographic growth became weak on the whole area of the City, and it was halved up to 1991. While the City of Belgrade grew for over 260.000 people during the previous inter-census intervals, the growth of 132.000 new inhabitants was recorded in the inter-census period from 1981 to 1991. In that period, the area of the suburban belt and the suburban municipalities (generally speaking, because not all the settlements of this area had positive demographic trends) took over the priority in the dynamics of growth.

The stages of the urbanisation that the City went through were described by the directions and dynamics of the population development during the second half of the 20th century (Table 16, Figure 28). The changes in the territorial distribution, spatial moving and structural changes of the population are in the close interaction with the developmental flows and the urban agglomeration spreading:

- from the urban part of the Belgrade settlement, which today includes the urban parts of 10 municipalities, characterised by the specific demographic development, and the polarisation of the demographic trends - a) depopulation in the oldest urban city core (the municipalities of Stari Grad, Vračar and Savski Venac); b) the dynamic population growth in the municipalities of Voždovac, Zvezdara, Zemun and Palilula; c) the intensive population concentration in the municipalities of New Belgrade, Čukarica and Rakovica;
- over the spatial and functional expansion on the suburban ring (formally other settlements of the urban municipalities), with strong demographic transformation;
- to the fast structural changes in the suburban belt, which reflected strongly (and divergently) to the dynamic changes in number, distribution and structure of the populations of the suburban municipalities of Barajevo, Grocka, Lazarevac, Mladenovac, Obrenovac and Sopot.

Table 17: Changes in population number by municipalities³², 1948 - 2002.

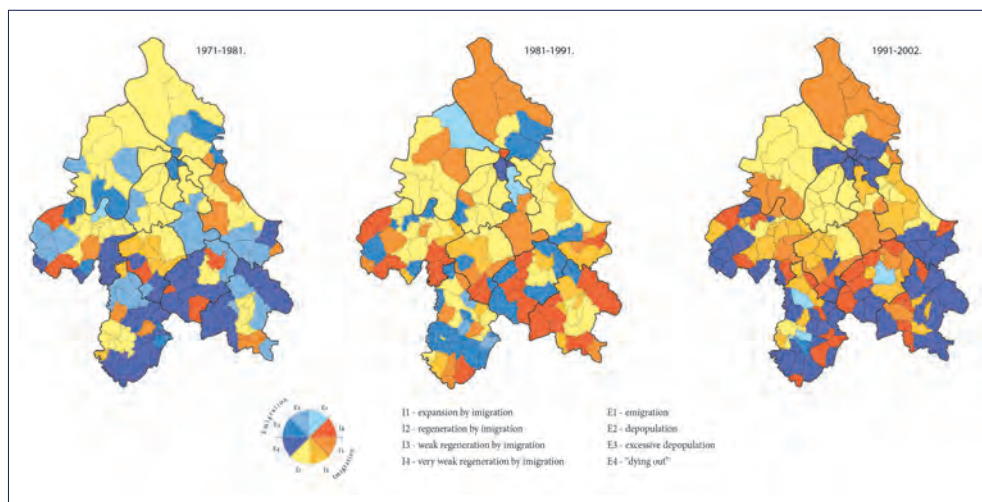
	Index of population change							
	According to methodology of previous censuses							Methodology 2002
	1953/48	1961/53	1971/61	1981/71	1991/81	2002/91	2002/48	2002/1991
City of Belgrade	115,4	128,7	128,4	121,6	109,0	102,3	258,5	101,5
Inner City	120,2	137,5	136,8	121,0	107,4	99,6	292,6	98,8
Vračar	120,9	117,7	95,3	93,6	88,4	88,4	99,1	86,6
Savski Venac	120,9	114,7	84,7	84,0	89,3	93,5	82,4	92,5
Stari Grad	120,1	118,7	86,8	88,1	96,0	83,0	86,8	81,0
Zvezdara	118,5	133,6	127,0	114,0	109,1	98,2	245,5	97,7
Novi Beograd	123,3	294,1	276,5	188,2	129,3	100,5	2453,2	99,6
Rakovica	113,4	179,2	177,5	171,4	112,3	104,6	725,9	102,8
Voždovac	116,9	139,6	157,0	118,7	101,3	97,8	301,5	97,1
Palilula	125,3	150,9	141,8	119,1	104,1	102,8	341,3	103,8
Zemun	116,2	142,7	146,0	123,1	105,5	109,0	342,2	108,8
Čukarica	115,2	151,2	202,2	129,2	117,0	112,8	601,0	112,1
Barajevo	104,2	96,2	94,8	113,7	115,1	119,5	148,5	118,2
Grocka	106,0	107,1	107,4	154,8	128,2	115,6	277,5	114,8
Lazarevac	106,6	113,2	104,0	111,8	115,3	102,2	165,5	101,1
Mladenovac	106,1	112,1	105,3	111,4	107,4	97,8	146,5	96,3
Obrenovac	108,4	108,4	110,4	117,6	112,2	105,5	180,6	104,9
Sopot	101,4	99,8	91,5	98,6	98,4	103,5	92,9	102,1

Source: Population Census of 2002.

³² By the most recent administrative-territorial change from 2004, the new municipality of Surčin was formed within the urban area of Belgrade by separating from the Zemun municipality. Due to data comparison, that was not done in the table.

In the first period of the city development, shortly after World War II, the central municipalities (Stari Grad, Vračar, Savski Venac) had the highest population growth rates. In the next phase (1953 - 1961), the population growth was more intensive in the broader, peripheral zone of the Belgrade settlement (the municipalities of Čukarica, Rakovica, Pali-lula, Zemun, Zvezdara), because the old, central core had already been urbanised and densely populated. The intensive construction of New Belgrade, the population of which was almost doubled in all inter-census periods from 1953 - 1981, contributed especially to the expansion of the city at the Srem part. Such spatial-demographic relationships in regard of the dynamics of growth of some parts of the city were also kept in the next ten years, although generally viewed, from the 1970s, the intensive growth of the central agglomeration became weak (except New Belgrade and Rakovica), in order that by the 1980s, a more rapid growth of the suburban municipalities started.

Figure 28: Spatial-demographic changes and relations in Belgrade.



Source: Statistical Office of the Republic of Slovenia.

In the following phase, the developmental flows which caused the functional and morphological transformation of the City were characterised by the change in the core/periphery relationship. The municipalities of old urban core became depopulation, while the population growth of the suburban ring was more intensive. In the first ones, the migration balance got negative values, while the natural increase began to reduce rapidly (in these municipalities, the considerably lower natural increase rates were recorded very early in relation to other parts of the city due to different population structure) as the result of changing the population reproductive norms, but also the more rapid demographic ageing. Hence, the depopulation process began in the inner, most urbanised area of the city at the time when the population growth and concentration were intensive and permanent in other parts of the city. Moreover, the developmental flows, with the transformation of the housing area into the business one, caused the population emigration. Thereafter, in the legitimate causative-effective connection of the demographic development, the depopulation process stimulated the further decline of the natural increase. Only ten years later, the data from the inter-census period of 1981 - 1991 pointed to the expansion of depopulation trends even in the wider zone of the Belgrade

settlement (in the urban parts, three additional municipalities: Voždovac, Zemun and Palilula), in order that they expanded on much larger territory (Zvezdara and New Belgrade) during the last decade of the 20th century (Smiljanić, Z. 2003).

New Belgrade, as the completely new settlement, built at the right bank of the Danube after World War II, had a specific and very dynamic demographic development. That proved explicitly on the enormous population growth for 25 times (from 9000 to 217.000) which occurred due to immigration from all areas of the former Yugoslavia and as a result of the population redistribution from other Belgrade municipalities due to intensive collective housing construction. At first, New Belgrade was the settlement with mainly residential function. By the time, within this residential zone, other functions also developed, so that in the last decade, New Belgrade got into a completely new phase of economic, spatial-structural and demographic development.

The intensive demographic changes began with the original development of industry, or the construction of the housing projects of escort character in the area of the suburban ring. Subsequently, the changes were directed differently in dependence on the developmental policy of the City and the directions of its expansion. In the 1970s, the significant population concentration was accomplished in the settlements at the left bank of the Danube (Borča, Krnjača), so that it came to their territorial growing together with Belgrade. In the period from 1971 to 1981, Borča doubled its population (from 9500 to 18.500), while by the 2002 the population doubled again at 36.000.

The situation was similar on the opposite side of the city, where some settlements of the suburban ring also had the sudden, and then stable demographic growth. The intensity of the mentioned processes was illustrated best in the settlements of Sremčica and Kaludjerica³³ which were the classical examples of the population expansion. In the Sremčica settlement, the population increased for five times (from 2400 to 13.000) in the mentioned ten years long period, in order that the constant temperate population growth was maintained in the next period (on about 20.000 inhabitants in 2002). The most drastic example of elemental urbanisation was the Kaludjerica settlement which in the period from 1971 to 1981 was demographically enlarged for 6.5 times, from 1900 to 12.400 inhabitants. Thereafter, in the period up to 2002, the population growth was constant (index 177). Kaludjerica was well known by the illegal "wild" construction by which it practically grew in Belgrade.

Among the suburban municipalities, the demographic flows passed through various phases. In the first phase, in the time of the expansive growth of Belgrade during the 1950s and 1960s, the population immigrated to Belgrade from a large number of the settlements of these municipalities. In the second phase, under the influence of the developmental influence of Belgrade, the municipalities of Lazarevac and Obrenovac, due to their closeness and development of industrial activities, also became attractive for the population migration from all parts of Yugoslavia. Nevertheless, the expansive growth mainly developed in the municipal centres and the settlements that were the closest to the municipal centres due to population immigration, while other settlements of these municipalities still recorded the depopulation. Among the suburban municipalities, the Grocka municipality "stood out", with the most dynamic population growth (just due to enormous growth of Kaludjerica). The Sopot municipality was characterised by the

³³ Administratively, Kaludjerica belongs to the suburban municipality of Grocka, but it is close to the settlement of the suburban ring by its location and spatial-structural changes.

opposite tendencies. As the most underdeveloped municipality of the Belgrade region and aside from the major highway directions, it became depopulation very early. The negative natural increase rates were recorded almost in the 1960s which caused, along with emigration, the intensive process of demographic ageing. It was interesting that after the 40 years long period of the population decrease, a relatively weak demographic "regeneration by immigration" was recorded in the last inter census interval.

The last decade of the 20th century was the period of the tumultuous changes on the whole territory of the former Yugoslavia, while the important historical events had the significant consequences on the demographic development of Belgrade. During the last decade of the 20th century, the dynamics of the population growth was retarded considerably and ranged at average annual rate of only 1.4 ‰. The population increased for 24.000 in the area of the City of Belgrade throughout the whole period (the amount of the average annual growth was the same in the periods of the most intensive agglomerating of the population) and it was exclusively the result of the population increase of the suburban region. Except the reduced field of the metropolitan influence in the significantly narrowed borders of the new state territory, the growth was also influenced by the weakening of the migration waves from the area of Serbia due to the economic crises (and already exhausted "emigrational reservoirs"), and the negative natural increase values. On the other side, the City was exposed to a special pressure of war refugees from the endangered regions, while at the same time a large number of inhabitants emigrated from the country.

8.3. The influence of migrations on the intensive demographic growth

As in the case of all large urban systems, migrations significantly influenced the growth and demographic development of Belgrade³⁴. The characteristics did not refer only to changed migration dynamics throughout different socio-historical periods, but also to their different scope and influence in the territorial expansion of the City. Moreover, the known selectivity of migrants according to sex and age was reflected in the characteristics of the demographic structures. The researches showed that, among the settled population, the statistical superiority of the female population was emphasized and that the largest number of inhabitants (over 50 %) aged between 15 and 29 changed their residence (Stevanović, R. 1999).

In the years of the greatest settling, between 1956 and 1966, the migration increase was around 20.000 migrants a year (Radovanović, S. 1999). During the inter census intervals from 1961 - 2002, the migration increase was declining successively: first, from about 18.000 to 15.000 per year on average; then the number was halved to 7000 persons per year on average; in order that in the last decade of the 20th century the mechanical increase was 5 times lower than in the years of the highest influx- 4300 per year on average. The fact that the mechanical increase was not registered in Belgrade for the first time in 1991 represented best the situation of the country in the years of the political and economic crises.

³⁴ The increase by immigration always represented the dominant component of the population growth of Belgrade: from 1.1 million which was the population increase of Belgrade in the period from 1900 to 1991, over 750.000 as the result of the mechanical population influx (Stojanović, 1999).

Table 18: Shares of migration and natural component in population growth of Belgrade.

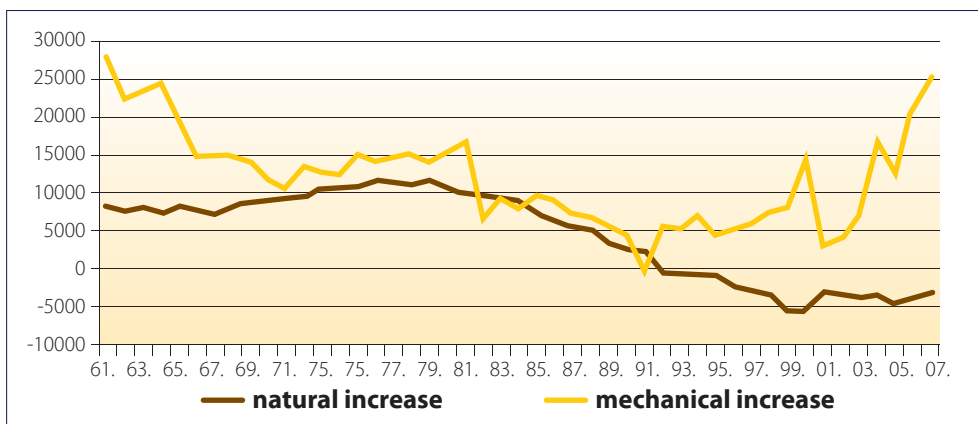
Inter-census period	Growth	Natural increase	Migration increase	Growth rate	Rate of natural increase	Rate of migration balance
1961-1971.	267170	83801	183369	24.84	7.79	17.05
1971-1981.	260713	108063	152650	19.46	8.07	11.39
1981-1991.	132153	62380	69773	8.60	4.06	4.54
1991-2002.	36417	-10849	47266	2.04	-0.61	2.65

Source: Statistical yearbooks of Belgrade.

In the structure of demographic growth of Belgrade during the 20th century, several phases can be distinguished regarding the influence of the migration component (Stojanović, B. 1999):

- the migration component dominated absolutely in the population growth of the city up to the beginning of World War II;
- in the second phase, after the war up to the 1970s, the migration influx was still large, but with a tendency of reduction in its share;
- between the 1970s and the 1990s, the contribution of the natural and migration component to the population increase became balanced;
- during the last decade of the 20th century, the migrations again became a decisive factor of the population growth, but this time not as a result of their scope, but due to negative natural increase.

Figure 29: Natural and mechanical increase of the population, 1961 - 2007.



Source: Statistical yearbook of Belgrade 2007.

Regarding the territorial distribution, 96 % of the migration influx was concentrated towards the central urban agglomeration all up to 1970s. In the 1980s, the influx towards the Belgrade settlement was reduced to 70 %, in order that in the 1990s, the degree of the immigration attractiveness of the Belgrade settlement became noticeably lower, only 53 % (Stojanović, B. 1999). The last decade was specific by the turn in the directions of immigration, so that almost 90 % of the migration influx of those years was directed towards the settlements of the suburban ring and the suburban municipalities.

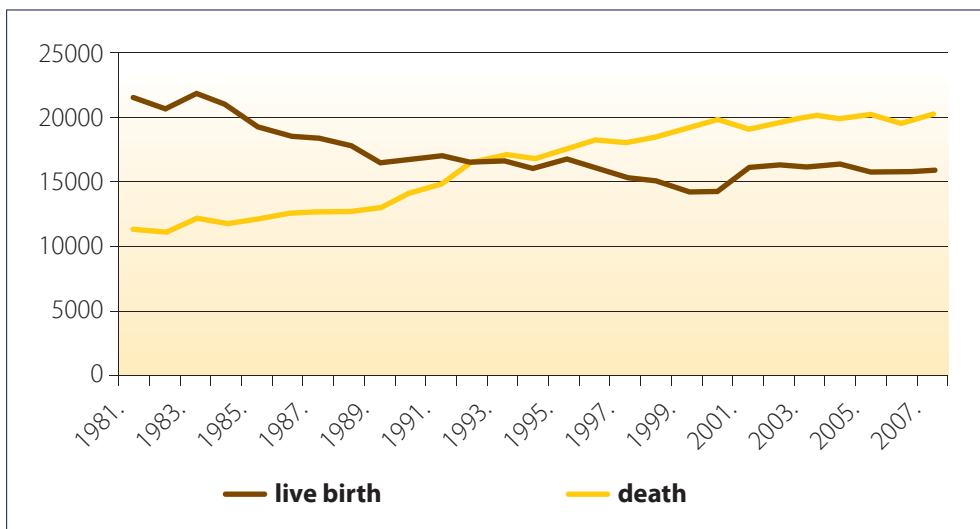
During that decade, the role of positive migration balance was emphasized in the conditions of the negative natural increase. Nevertheless, the reasons for migrations and the structure of migrants were significantly changed. Among the settled population (and there were 208.000 registered), the participants of forced migrations dominated. Moreover, in the conditions of instability, social and economic crises, the number of emigrants increased (it was estimated on 1.610.000), while the emigration of young and educated people characterised this contingent. The positive migration balance was realized mostly in the settlements away from the inner city area: the figure was 42.000 of the total migration balance of 47.266 persons. When the corps of 111.300 refugees was added to the estimated number of 35.000 of internally displaced persons from Kosovo and Metohia (the 2002 census) it turned out that every tenth inhabitant of the City of Belgrade was a refugee or a person endangered by war. The share of refugees in the Zemun municipality which had them most recorded (21.800) was 11.4 % in the total population (Rašević, Penev, 2006).

8.4. Tendencies in the Natural Development of the Population

Historical-demographic researches point to a very unsuitable situation in regard of the natural development of the Belgrade population during the 19th century (Sikimić-Spasovski, M. 1977; Radovanović, M. 1974; Vojković, G. 1992). The following specific demographic and social-historical factors are mentioned as the reasons of the negative rates in the conditions of low natural increase and very high mortality: the living conditions in the former urban area, frequent epidemics, the low health care level, disturbed sex structure, but also the methodological lacks of the vital statistics of that time. The years of positive natural increase were uncommon, confirming that "Belgrade developed least from its own biological strength" (Radovanović, S. 1999 : 49). A period of positive balance between births and deaths began by the 1920, but the natural increase rates remained low, so that Belgrade, in the Yugoslav scales, stood out by its extremely low natural increase rates. According to Bogavac T. (1991), Belgrade was forced to base its development on the natural increase only, while on the population increase which was realized from 1920 to 1931 it should have waited the whole 75 years.

Shortly after World War II, the natural increase of the Belgrade population grew due to considerable birth rate increase (the rates exceeded 20 ‰) during the so-called compensational period, and continued tendencies of the gradual mortality decrease. However, the birth rate became steady at about 14 ‰ relatively quickly, in order that by the beginning of the 1990's, it decreased at about 10 ‰. The crude death rate reached its lowest level of 5.4 ‰ in 1965/66 as the result of greater social care for people's health, but also of relatively young age structure of the population. In the following period the level of the crude death rate would be in a constant increase under the direct influence of the age structure of the Belgrade population, and at the beginning of the 1990s, the crude death rate would be returned on the level before World War II.

Figure 30: Natural movement of the population of the City of Belgrade, 1981 - 2007.



Source: Statistical yearbook of Belgrade 2007.

During the 1960s, owing to the natural component, the population of Belgrade increased on average for about 8400 per year, by the rate of natural increase of 7.8 ‰ (Table 18). In the period from 1971 to 1981, although average annual natural increase rate did not have more significant increase (it was 8.1 ‰), the absolute natural increase was enlarged for almost 30 %. The trend of the natural increase decline began from the 1980s. During the inter-census interval from 1981 to 1991, the natural increase reduced in the absolute amount for over 40 % (on 6.200 per year on average, with the rate of 4 ‰, but since migrations went into a phase of calm during those years, the significance of the natural component in the structure of the Belgrade population growth has become more emphasized.

The overall demographic trends were also reflected in differences regarding the natural increase of the population of the municipalities of Belgrade region. Nowadays, the natural increase has been negative in all municipalities, but the history and tempo of its decrease were different. Thus, for example, in 1970s the natural increase rates were even 10 times higher in the municipalities with the strongest population immigration. The natural increase rates at Čukarica, Zemun, Voždovac, Palilula (all the municipalities of dynamic development of the settlements of the suburban ring) were ranging in the interval from 10 to 14 ‰. Higher rates of the natural increase also had the newly formed municipality of Rakovica (around 13 ‰), while the rates of the natural increase which exceeded the Belgrade average were also recorded at New Belgrade and Zvezdara. Regarding the demographic development of Grocka, a rise in the natural increase of this municipality (at 8.5 ‰) in the 1980s appeared as the reflection in the demographic expansion by the young population immigration and population 'rejuvenation'. The antipodes of the mentioned municipalities were the central urban municipalities with extremely low natural increase (Vračar and Stari Grad 1.5 ‰) or suburban emigrational municipalities of Sopot and Barajevo where, at that time already, there was not natural increase of the population. Today,

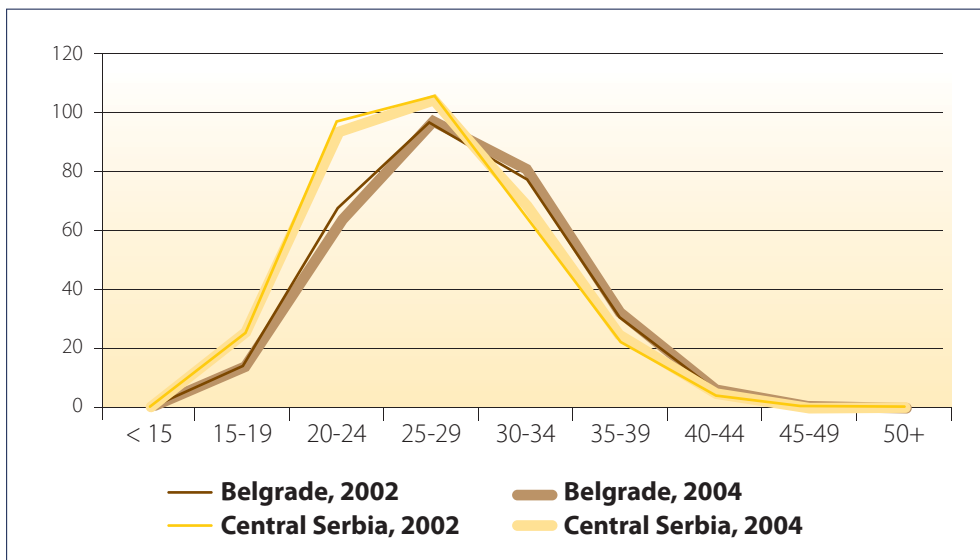
all these municipalities have high negative values of the natural increase which exceed - 10 ‰. The demographic and socio-demographic structure and higher reproductive norms of the population in the suburban municipalities (Lazarevac, Obrenovac, Grocka) and settlements of the suburban ring (Rakovica, Čukarica) would contribute to the later phenomenon of the negative natural increase (in the 2000s) on these areas.

Summing up the mentioned, it can be said that the influence of the natural increase on the increase of the Belgrade population was undoubtedly less significant than the migration component especially that its continuous declining began after the characteristic post war rise and relatively high level up to the 1950s. In regard of the natural increase, Belgrade follows the trend of the population growth in central Serbia and Vojvodina, so that in 1992, the negative natural increase was recorded in the area of the city for the first time after World War II. Since that year, the negative difference between births and deaths has become the characteristic of the demographic development of the City, as well as central Serbia, while the lowest rate of natural increase of - 3.3 ‰ was recorded in 2000. It is obvious that those are the first effects of the increased births (in the period from 1971 to 1981 the influx of more numerous generations in the reproductive contingent reflected in the rise of the natural increase rate at 15 ‰), realized by intensive immigration and more significant participation of young population which, thereafter, were annulated by the impacts of the factors of living in a large city. That just confirms the rule that the migrant population changes relatively quickly their reproductive behaviour and accepts lower reproductive norms of urban population. Throughout the 1980s, the fall of the natural increase became intensified, so that the previous advantage was lost in relation to the average of central Serbia.

Tumultuous social changes, deep economic crisis, especially in the period of the sanctions of the international community, the social changes and the institution crisis in the times of 'surviving', with the special implications and problems of living in a large city which also bears many structural obstacles (starting from the unsolved housing problems and unemployment, the baby-sitting problems, to all those characteristics assigned to unsatisfied economic standard, intensified particularly in the large city), certainly left deep trails on the reproduction of the population of Belgrade. Low fertility rate of population is the general characteristic of present demographic and social moment in Serbia. However, the fact that the City of Belgrade, as a pole of the expressive demographic concentration, and relatively more favourable age structure of population in relation to other areas of Serbia, has been classified into low birth rate area and that it has a clear and constant decline of births is socially upsetting. It is obvious that those numerous factors which are commonly noted as the causes of low fertility of population in the contemporary society (low standards on the desired number of children due to high economic and psychological price of raising a child, high expenses in arranging the parentage and professional activity, the feeling of insufficient security or emphasized individualism) are more expressive at present social and economic climate in Belgrade than in other areas in Serbia with low birth rate. Moreover, the phenomenon of delayed births in Belgrade, especially in the central urban municipalities, is more expressive than in other areas in Serbia with low birth rates. Almost 60 % of women aged 25 - 29 and every third woman aged 30 - 34 in Belgrade did not bear a child (Rasević, Penev, 2006). In the 1970s, the largest number of births (43 %) had mothers aged 20 - 24, while their share is reduced at 23 % in 2002. Age limit of the largest number of births (34 %) is raised to 25 - 29 years. Moreover, mothers aged 30 - 34 make more than one-fourth, so that the share of older

mothers is doubled in relation to the 1970s. During the last few years, it has come to further moving of woman's child-bearing years in relation to 2002. Age fertility rates 20 - 24 declined from 67.9 ‰ to 62.6 ‰, while age fertility rates 30 - 34 increased from 77.6 ‰ to 80.2 ‰. The differences are significant in relation to the average reproductive model in central Serbia (Figure 29) where age fertility rates up to 29 are higher, while they are lower in older ages. At the beginning of the 1990s, the total fertility rate in Belgrade was already 1.56 children per woman in order that it declined at the lowest level of 1.3 children per woman during the critical 1999. In that year, the lowest number of live births was recorded in Belgrade (14.182). Nevertheless, in the following years the number of live births increased, total birth rate was stabilized at about 9.8 ‰, while total fertility rate was stabilized at 1.5 children per woman (Penev, 2005).

Figure 31: Fertility rates in Belgrade and central Serbia according to mother's age.



Source: Statistical yearbook of Belgrade 2007.

8.5. The main characteristics of demographic structure

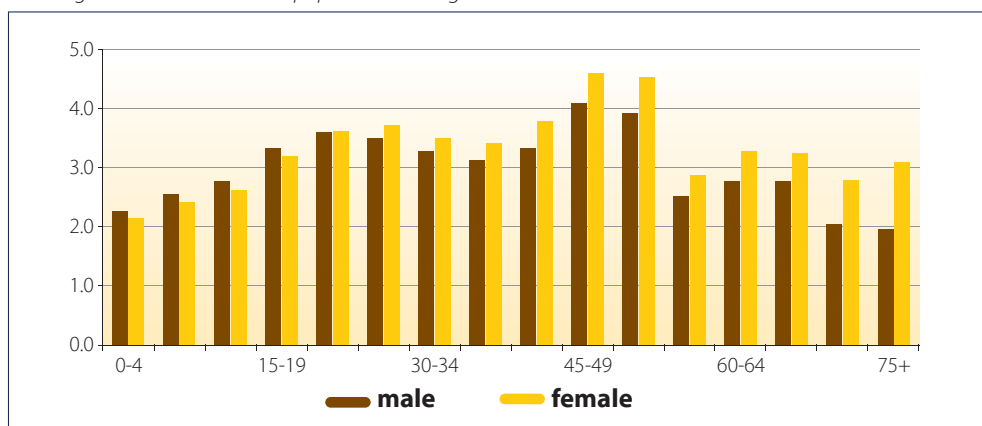
The population growth of Belgrade, the migration trends and the trends of the natural increase are closely connected with the changes in the structural characteristics of the population.

In contrast to the imbalance in the sex structure of the population of Belgrade, which throughout the whole 19th century and the first half of the 20th century was characterized by the considerable lack of the female population, the second half of the 20th century was characterized by the domination and constant increase in the share of the female population. New socio-historical relationships, the change of the socio-cultural milieu and the changes in the position of woman in the socialist society were closely connected with such characteristics in the sex structure of Belgrade. The last census of 2002 showed larger numerosness of women for over 80.000 and their share of 52.6 % in

the total population. The decrease in rates of masculinity (from 954 to 903, according to the 2002 census) was a trend, opposite from the one at the population of Serbia and it was the result of the dominant role of the migrations in the increase of Belgrade population where the share of the female population was larger. The differences in sex structure of population of the inner city territory in relation to broader area of the city also pointed to it, while the differences were more striking on the municipal level: the highest sex imbalance to the female population was in the municipalities of the inner city core; the suburban municipalities were on the other pole with the considerably more balanced sex structure, or even with 'surplus' of men in the rural area³⁵. Almost from the age of 15, the rates of masculinity in Belgrade were lower than those in the area of central Serbia, while the differences in age from 35 to 59 increased. In central Serbia, the rates of masculinity decreased below 900 from the age of 55, while in Belgrade, at all five - year groups after the age of 35.

The female population aged 20 was more numerous, and there were two reasons of the imbalance in the sex structure. At younger middle - aged population, the imbalance was mostly the result of the migrant selectivity according to sex (women were more numerous in migration)³⁶, while the differences in mortality between the sexes contributed to the imbalance at older population.

Figure 32: Sex structure of population of Belgrade in 2002.



Source: Statistical yearbook of Belgrade 2007.

In the area of Belgrade, migrations influenced more significantly the formation of the population age structure than it has been usual in other areas. But, regardless the huge constant population influx, the fertility decline together with the increase of life expectancy caused the continuing developing of the demographic ageing process. During the second half of the 20th century, in the area of the City of Belgrade, the share of persons younger than 20 decreased from 32.1 % (in 1953) to 21 %, whereas the participation of old increased significantly from 8.1 % to 21.6 %. In the absolute term, the number of old aged 60 and more increased for almost six times (from 59.000 to 341.000), while the

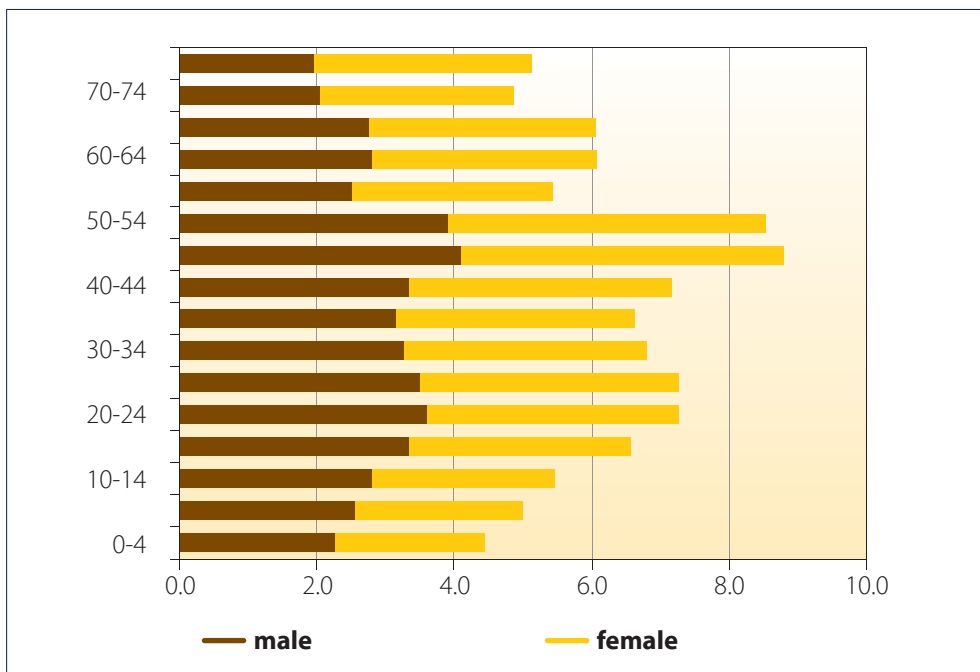
³⁵ More about it: Penev, 1999. The example of the municipality of Lazarevac is interesting, where the structure of the economic activity obviously influenced the higher rates of masculinity in the urban centre also in relation to other municipalities.

³⁶ The contrary, in the rural areas of the Belgrade region, women were more numerous in emigration, especially during the 1950s and 1960s, so that it reflected in higher rates of masculinity of middle-aged and older population in these settlements (Penev, 1999).

increase of the young population contingent was only 40 % (from 238.000 to 330.000). The great increase of the old population contingent was followed by the entry of many generations from the time of the intensive migration of the 1960s. It is interesting that up to 1981, above the reduction of the relative share, the absolute number of young was increasing, while during the last two decades their absolute term was decreasing (index of 85.7). In that way, the number of old exceeded the number of young in Belgrade.

While in the 1970s the population of the inner city area was demographically younger, because the immigration was directed towards the central parts of the City³⁷, up to the 1990s, the situation changed completely due to peculiarities of the spatial-demographic transformations. Except that this area always had higher fertility rates, the migration towards the periphery of the city in this period also contributed the situation. According to all characteristics of age structure (average age 40.4, age index 1.03), the population of the City of Belgrade belonged to the regressive type and it was classified into the group of demographically oldest population (the stage of deep demographic age). The characteristics of its age structure did not differ much from the age structure of the population of central Serbia. Taking into consideration the increase in the number of older middle-aged persons (coinciding of many generations born in the time of baby boom after World War II and large migration balance of immigrants from the period of still intensive immigration during the 1970s) and expected further mortality decline at older population, the more rapid ageing process could be expected in the following period.

Figure 33: Age-sex structure of population in 2002.



Source: Statistical yearbook of Belgrade 2007.

³⁷ According to the 1971 census, the share of the middle-aged and younger middle-aged population (20-34 years) was notably smaller in the age structure of the population in the peripheral area of the City than it was the case in Belgrade. The migrations influenced the considerable lack of the middle-aged persons, directed mainly towards the central urban agglomeration (Penev, 1999).

And even though the process of the demographic ageing did not start at the same time and develop in the same tempo, today that has been the characteristic of all municipalities. At first, migrations were the significant factor of keeping relatively more favourable age structure of the population of some municipalities, and in dependence on the spatial redistribution of the migration to certain territories, the age structure of the population also changed. When the immigration became calmer, the negative influence of the reduced fertility was clearly expressed, so that the ageing was more intensive in all municipalities. For example, the municipality of Rakovica, characterised by very intensive demographic growth of the 1970s, high positive migration balance and higher fertility rates, had the most favourable age structure of the population (index of ageing 0.2, share of old about 6 %, young over 30 %) according to the 1971 and 1981 censuses. According to the last census, the share of old population also exceeded the share of young (21.7 % : 20 %), the index of ageing was 1.07 and the average age of the population was 41 years. Similar processes also occurred in New Belgrade, and according to the last census, those two municipalities have been in a group of the populations with deep demographic age.

Today, the municipalities of old city core, being the emigration areas since 1960s (being also followed by corresponding changes in the population reproduction-total fertility rates below 1.3 children per woman) have been certainly characterized by the most developed process of ageing. Ageing was especially intensified during the last decade, so that the shares of old population in the total population of these municipalities (from one-fourth in the municipality of Savski Venac to 27.6 % in the municipality of Vračar) exceeded significantly the share of young (it ranges from 17 % to 19 %). The average population age of 44 years speaks on the stage of the so-called 'deepest demographic age'³⁸.

Generally, today the suburban municipalities have relatively more favourable age structure of the population. Nevertheless, in dependence on the total developmental and demographic trends, they differentiate in regard of the stage of the demographic age. The municipalities of Lazarevac and Grocka are among the 'youngest', the municipality of Sopot, as typically underdeveloped and depopulation area, is among the 'oldest'. Due to large influx of immigrants, the 'rejuvenation' of the population appeared in the municipality of Grocka at one period. According to the 1971 census data, it was included into the category of the oldest Belgrade municipalities, and then the complete change occurred. The population growth in some smaller settlements (first of all in Kaludjerica) took the scales of the real 'demographic explosion', so that in 1991 Grocka became the Belgrade municipality with the youngest age structure (Penev, 1999). Even today, this municipality has the lowest index of ageing of 0.8 and the lowest average age - 39 years.

³⁸ According to the criteria for determining the stage of the demographic ageing of G. Penev (1995), the Belgrade municipalities are included into the following groups: Vračar and Stari Grad - the seventh stage of the deepest demographic age; the greatest number of the municipalities of the central agglomeration (Savski Venac, Zvezdara, Voždovac, Rakovica, New Belgrade) and the suburban municipalities of Mladenovac, Sopot and Barajevo - the sixth stage of deep demographic age; the municipalities of Čukarica, Palilula, Zemun and the suburban municipalities of Obrenovac, Lazarevac and Grocka - the fifth stage of demographic age.

8.6. Conclusion

The key problem of the present-day Serbia is the expressive disproportion in the regional and demographic development. The strengthening of the political-administrative, economic and cultural-educational functions and the role of Belgrade in the regional development of Serbia and wider encirclement obviously had a strong influence on the population growth, territorial expansion and redistribution of the former town into the metropolitan of broad field of influence. In the short period, Belgrade grew into the powerful pole of the concentration of the population and activities, and the factor of controlling the demographic flows in the wider area. Today, the counterpoise that creates the balance to Belgrade in the demographic and regional development does not exist in the geo space of Serbia.

Migrations played the key role in the rapid growing of the city. Both the dynamics of immigrations and population growth can be separated into several phases, different by the intensity, scope and included area. The differences in migrations influenced the differentiation of the Belgrade area and they have been in the close interdependence with the functional, urban-territorial and socio-economic development of the parts of the city and suburban regions (Radovanović, M. 1984). In the period of the intensive industrialization and urbanisation of Serbia, Belgrade had the role of the central pole of the population concentration, and it was the period of massive, elemental and intensive demographic changes in the inner city area. Thereafter, in a causative-effective link, large changes in the spatial-functional structure and socio-economic development of the Belgrade region reflected in the intensive spatial-demographic and structural-demographic changes. The changes of the functional profile of the city or parts of the city, the formation of larger residential zones, in direct nearness of the central agglomeration in most of the cases, the development of the secondary centres (municipal centres mainly) - all that directed the migration flows, influenced the redistribution of the population of the City, caused differences in the tempo of the development of demographic processes on different areas of the city and intensified or weakened the population growth of certain settlements. The developmental and demographic impacts of Belgrade were much wider than its administrative area, and that referred especially to strong impacts in the municipalities of Pančevo and Stara Pazova.

In the 1980s, Belgrade got into a phase of the immigration quieting and new processes in the spatial redistribution of the population within the region. New relationships were established on city-periphery relation. The transition of fertility brought to the changes in the reproduction of the Belgrade population, (rates of natural increase had low or stagnant values) that would be sublimated in the following stage through the process of depopulation in the urban city core, by insufficient natural increase, quieting of the demographic processes and demographic ageing. Nevertheless, the extraordinary circumstances from the end of the 20th century were manifested in Belgrade through the massive influx of the refugees and the so-called internally displaced persons, and they influenced the level of fertility and the overall structure of the population over the socio-economic conditionality.

Within the Belgrade region (the City of Belgrade, the area of 17 municipalities), the differences were expressed clearly in demographic development of the inner core of the

central agglomeration (old urban core), the wider area of the central agglomeration, the suburban ring and the suburban municipalities (in which, the municipal, urban and industrial centres and their suburban zone are also differentiated from other rural settlements). By the 1991, the population of all suburban municipalities increased (except Sopot), while in the last inter-census period the increasing trend remained only in the municipalities of Grocka and Barajevo. According to the projections of the population, there were also differences in the following period, when depopulation continued in the Belgrade settlement, while the wider area of the city still recorded the increase. From 1992, the City of Belgrade had negative rates of natural increase that were recorded first in the inner city area, while they were also recorded in the settlements of the wider zone after four years. The mechanical component, actually, alleviated the tempo of the population decreasing. Today, according to the main characteristics of age structure, Belgrade belongs to a group of demographically older populations. Both the number of young and older than 60 have almost been equal, and only every fifth inhabitant of Belgrade is younger than 20. In the following period, the further population ageing should be expected, which would develop from the basis, but even faster from the top of age pyramid (Rašević, Penev, 2006). The changes in the scope and share of the most important age-functional contingents would be in the reduction of children of pre-school age and school-compulsory age, as well as the female fertile contingent.

9. Daily urban system of Ljubljana

Nataša Pichler-Milanović, Marko Krevs

Central position within the country and historical development of Slovenian urban system in general, including relatively low level of urbanisation of the country and growing economic power of its capital, have led to a relatively extensive and lively daily urban system of Ljubljana. Daily (or local) urban system is defined as the area around a city in which daily migrations to this city take place (Bourne, 1975). It comprises of the city and its surroundings which is functionally related to the city on a daily basis. Although the term is based on such a simple feature as daily migrations, it expresses much wider spectrum of ties and interdependencies between the city and its surrounding territories. It usually brings forward economic, social and environmental aspects of the daily migrations and the related processes in the city and its gravitation area. Several aspects of the driving forces and consequences of the Ljubljana's daily urban system are presented in other chapters of this book. The main aims of this chapter are therefore to present different possible approaches to identification of daily urban system of Ljubljana, selected methodological issues and results of recent research related to Ljubljana's daily urban system, its character and relative strength within Slovenia.

9.1 Several approaches to defining daily urban system of Ljubljana

Studies of Ljubljana's daily urban system have usually focused on daily commuting to work (Pavlin, Sluga, 2000; Kreitmayer McKenzie et al., 2008), some included also daily migrations to public educational institutions (Gabrovec, Bole, 2009). Data used in such studies of daily migrations between municipalities or settlements have been extracted either from the national census databases (SURS) or the national Statistical register of active working population (SRDAP). Approximations of a daily urban system can also be based on city urban and suburban public transportation network, or on appropriate administrative area correlating the best with the local urban system of a city.

Urban pomerium (Vrišer, 2002) of Ljubljana, the administrative area of the city, has been historically only occasionally correlated to the local urban system. Its extent mostly followed the growth of the city itself since 1788 until 1945. The administrative area has been enlarged after World War II to incorporate surrounding urbanized settlements tightly connected to the city, and reached nearly the extend of today's Urban municipality of Ljubljana. That area has probably been quite a good spatial approximation of daily urban system in that time. Municipal division of Slovenia in 1955 discontinued to follow legal and administrative definitions of urban entities. Ljubljana has been divided among several municipalities which stretched from Austrian to Croatian border and therefore contained considerable areas beyond the actual daily urban system of Ljubljana. Such administrative organisation of Slovenia existed with slight modifications until 1994. Towards 1990s daily urban system of Ljubljana has grown considerably, but never really

reached the full extent of “five communes (municipalities) of Ljubljana”. Since 1994 the pomerium of Ljubljana has been re-established by Urban municipality of Ljubljana with the area only slightly larger than in the period 1952-1955. The daily urban system has grown far beyond this area since 1950s. As shown further on, today’s daily urban system of Ljubljana correlates quite well with the extent of NUTS 3 region Central Slovenia (known also as Ljubljana Urban Region).

The urban and suburban public transportation network in principle expresses the power of gravitation towards Ljubljana (Černe, 2002) and therefore its spatial extent should correlate with the area of daily urban system of Ljubljana. The main difference between the two is that the Ljubljana’s suburban public traffic network does not cover the north-eastern gravitation area of Ljubljana, for example toward municipalities of Domžale, Litija, Lukovica, Moravče and Kamnik. These areas are serviced by other public transportation networks. Another important obstacle to use of public transportation network as an approximation for a daily urban system in general is the persisting extensive use of personal transportation for commuting. While this does not affect so much the spatial overlap between the two in our case, it could be misleading when considering the quantities of commuters from different parts of the daily urban system to the city.

In our research (Kreitmayer McKenzie et al., 2008) Local Labour Systems (LLS) have been applied as an effective approach to identification of daily urban systems in Slovenia. Some methodological issues of the approach and selected results related to daily urban system of Ljubljana are presented in this chapter.

The work on studying commuting patterns within Slovenia continues also as a basis to define »functional regions« in order to understand them better from the perspective of (inter)national competitiveness and effectiveness of development activities as the instrument for implementation of national policy recommendations for sustainable spatial and balanced regional development as well as the establishment of administrative NUTS 3 regions (provinces) in the near future (Pogačnik et al., 2011; Drobne, Konjar, Lisec, 2009; Drobne et al, 2009; 2010; Zavodnik, Drobne, Pichler-Milanović, 2009).

9.2. Main methodological problems in defining daily urban system

Several methodological questions need to be answered in a study of daily urban systems, among them the following.

- Who are daily migrants within a daily urban system? How to measure the contribution of different groups (or types) of daily migrants to daily urban system? Which is the structure of daily migrants? What is the relevance and quality of data available for the study?
- Which are the spatial units, between which the daily migrations are studied? Do we take the actual travelling routes into account?
- How to define the spatial extent of the daily urban system? How to take the overlapping between the neighbouring daily urban systems into account?

There is no possibility to take all daily migrants and all possible daily migrations into account in such a study. We therefore always focus on a selected part of the migrants and migrations and suggest they are a reasonable basis for representation of the whole daily urban system. The above mentioned selection usually depends on the availability of relevant data. In our case data about daily commuting to work have been the main and the most detailed source of information. Migrations to work are the prevailing type of daily migrations to Ljubljana. However, we are aware that spatial patterns of other types of migrations, like migrations to schools, health related institutions, or recreational facilities, might locally differ from the "core" daily urban system we are recognizing on the basis of the analysis of commuting to work. The structure of the daily migrants has been estimated indirectly, on the basis of another study (Gabrovec, Bole, 2009).

Among the problems related to the quality of data the following might be affecting the results of the analysis the most. Many (more than 5 %, estimated by Zaletel, Ziherl, Dolenc, 2004; about 10 %, estimated by Gabrovec, Bole, 2009) individuals keep their formal address of permanent residence after moving to other settlement or municipality. Several employers do not report adequately the actual locations of individual jobs because some firms present all the employed at the location of the seat of the firm instead of at the locations of actual branches. Since a daily migration is analytically derived from databases on the basis of difference between the registered place of residence and place of work (or selected other activity) of an individual, the above mentioned errors result in erroneously derived daily migrations.

The two main data sources for studying daily migrations in Slovenia, population censuses (SURs) and the register of commuters-to-work (SRDAP), should theoretically allow studying daily migrations between settlements or even at more detailed spatial scale. Population census registers the address of each resident and in case of migrations to schools also the settlement of the relevant school. It does not register the location of work, but it allows linking with relevant database to extract such information for each employed resident. In practice the local level daily migrations are usually studied on the basis of data aggregated by municipalities, which was also the case in our study (Kreitmayer McKenzie et al., 2008).

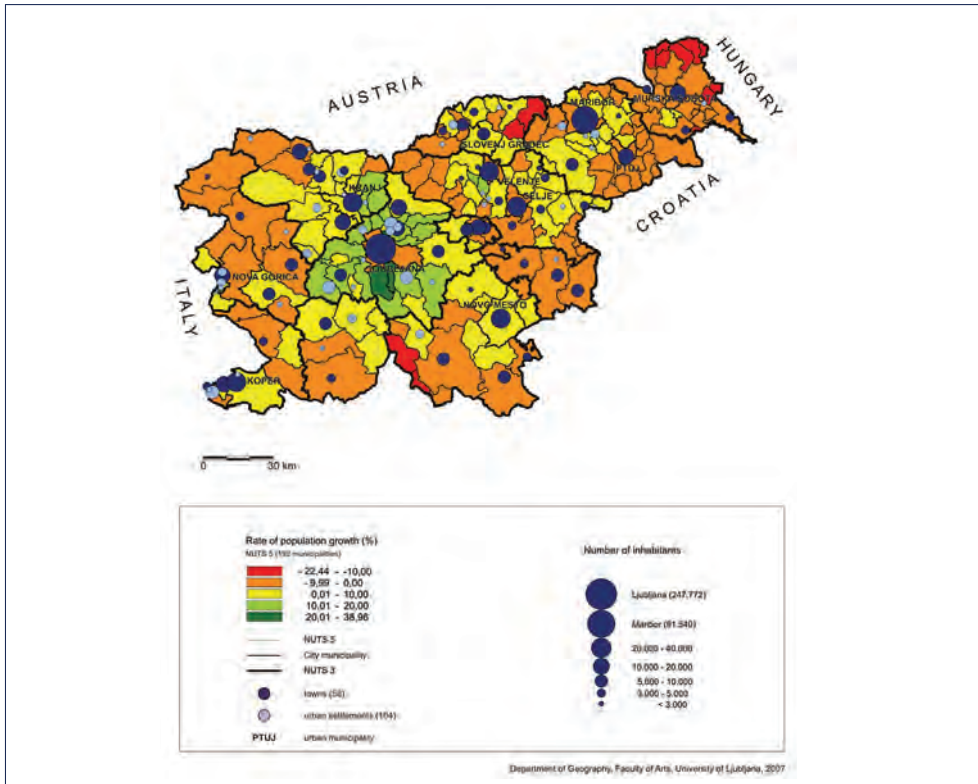
In such studies only the source and destination locations (in our cases municipalities) are usually taken into account. We assume that at this spatial scale the actual travel routes, e.g. to shopping or recreational activities by the way to work or home, lie within the analysed daily urban system.

Spatial extent of a daily urban system could be defined on the basis of all daily migrants (of a selected type) to Ljubljana. But already if we take commuters to work alone into the account, this method would recognize the whole Slovenia as Ljubljana's daily urban system, since there is no municipality without at least a few commuters to Ljubljana, as registered by SRDAP (2005). Among the reasons against such an approach the following is probably the most persuasive: it is very unlikely that the registered commuters from country's border areas actually migrate to Ljubljana on a daily basis. The above mentioned errors in data affect the most the representation of daily migrations from these areas. Besides, even when the data from SRDAP are taken as reliable, majority of daily migrants from these "far-away areas" are migrating to other centres, and only a small share of them to Ljubljana. Another approach to defining daily urban system of Ljubljana, based on the share of local commuters to Ljubljana, was used in our research.

9.3. Relative situation of Ljubljana's daily urban system within Slovenia

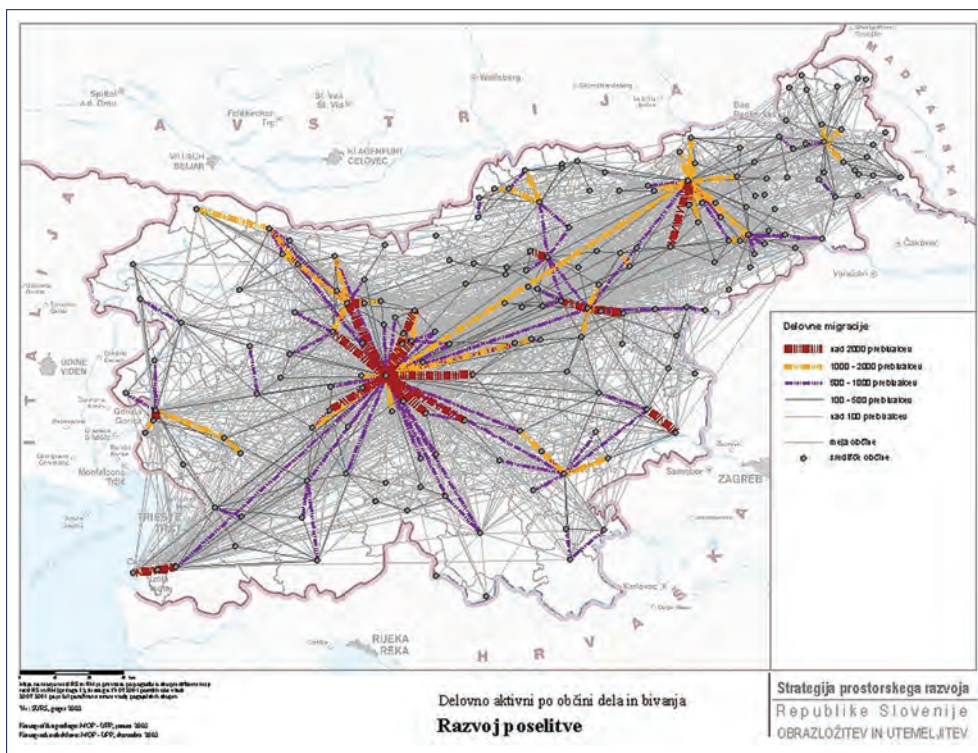
Between census years 1991 - 2002 the number of population in Slovenia had increased for 2.6 %, and in the period 2002 – 2009 additionally for 3.5 %, while share of urban population stagnated around 50 % (50.5 % in 1991, 49.0 % in 2002 and 50.1 % in 2009). Slight urban population decline was mostly visible in the largest urban municipalities and towns in Slovenia: Ljubljana, Maribor and Celje. However, by far the biggest population growth in Slovenia has been documented in suburban municipalities around Ljubljana (Figure 34). Ljubljana is a capital of Slovenia and its economical and political powers are growing, so we should expect strengthening and growing of its daily urban system. The aforementioned contiguous population growth area, with Urban Municipality of Ljubljana as the area of population stagnation in the centre, spreads well beyond the limits of Urban Region of Ljubljana³⁹. Since this area of strong process of suburbanization, partly in a form of urban sprawl and supported by migrations of urban population to suburban areas, overlaps quite expectedly with the daily urban system of Ljubljana, the processes of intensification of daily commuting to Ljubljana can be quite clearly noticed. Travel-to-work migration flows in Slovenia (Figure 35) illustrate clearly the relative strength of the daily urban system of Ljubljana within the national perspective.

Figure 34: Population change (%) in municipalities (NUTS 5) in Slovenia in the period 1991-2002.



³⁹ Urban Region of Ljubljana coincides with Statistical region of Central Slovenia (NUTS 3).

Figure 35: Travel-to-work migrations in Slovenia according to municipality of residence and municipality of work.



Source: Strategy of Spatial Development of Slovenia (2004).

Ljubljana attracted 103.000 inter-municipality commuters-to-work in 2007, which is nearly 30.000 more (41 % more) than in the year 2000 (Gabrovec, Bole, 2009, 26). The number of those that work and have residence in Urban Municipality of Ljubljana have stayed the same in this period of time, which clearly shows the intensity of the process of growing daily commuting to work in Ljubljana. Estimation of the total number of daily migrants to work, to secondary and higher education in Ljubljana approached 150.000 (ibid., 26). This is about a half of the population of Ljubljana. In other words, the daily migrants represent about one third of the daily population of Ljubljana.

Based on register of commuters-to-work (SRDAP, 2005), there were more than 186.000 jobs in Urban Municipality of Ljubljana, nearly 90.000 incoming migrants to work, more than 13.400 outgoing migrants to work, while nearly 97.000 residents of Urban Municipality of Ljubljana worked in this municipality in 2005 (Kreitmayer McKenzie et al., 2008).

In Slovenia the number of daily migrants related to public education of different levels (from elementary school to university) has increased by 40 % between the censuses in 1991 and 2002, while the number of daily commuters to work has increased by 13 % (Gabrovec, Bole, 2009, 24). In the total number of daily migrants in Slovenia, the share of daily commuters to work has been about two thirds, and the share of daily migrants related to public education about one third in 2002. In Ljubljana the relation among the two groups of migrants is different: about 43 % daily migrants to schools, and about 57 % to work.

9.4. Local Labour System as approximation of daily urban system of Ljubljana

Daily urban system is ideally understood as monocentric area of daily migrations. In reality cities are increasingly interdependent and daily urban systems are increasingly overlapping. One of the possible approximations of a daily urban system is the area for which the city is the main daily migrations' target. That principle was used in defining Ljubljana's Local Labour System (LLS), our approach to identify its daily urban system.

An international definition used in INTERREG III B CADSES RePUS project (Kreitmayer McKenzie et al., 2008) defines LLS as a »microregion« consisting of urban centre and its commuting catchment areas. It is defined and delimited according to the number of jobs in the urban centre (NUTS 5 municipality) and travel-to-work area to the urban centre. LLS area is spatially delimited using the method of regionalisation. In the first step preliminary set of urban centres were selected as those NUTS 5 municipalities with a minimum of 1000 jobs. This includes also smallest towns and urban settlements with population below or around 3000 and some industrial or growing suburban villages in metropolitan areas. Not all of these municipalities really play the role of the urban centre. The urban centre is such NUTS 5 municipality which is the main commuting destination for at least one another municipality. Therefore information about job commuting between municipalities needs to be utilised (SRDAP, 2005). After selection of urban centres that have at least 1000 jobs, that are the major travel-to-work destination for commuters for at least one other municipality, the next step is clustering the municipalities that are not selected as job centres for delimitation of LLS boundaries. Municipalities belong to the LLS area to which they have the strongest commuting flow⁴⁰ to selected urban centres. The principle of territorial coherence is acknowledged leading to spatial adjustments in the case of some municipalities in between two or more LLS.

Local Labour System of Ljubljana consists of 9 NUTS 4 areas. This is the largest LLS in Slovenia representing the metropolitan area of the capital city of Ljubljana. LLS Ljubljana is larger than NUTS 3 Ljubljana urban region (or Central Slovenian NUTS 3 region) for NUTS 4 Zagorje located in Zasavje NUTS 3 region east from the city of Ljubljana and NUTS 4 Trebnje, located south-east from the city of Ljubljana in South-eastern Slovenia NUTS 3 region.

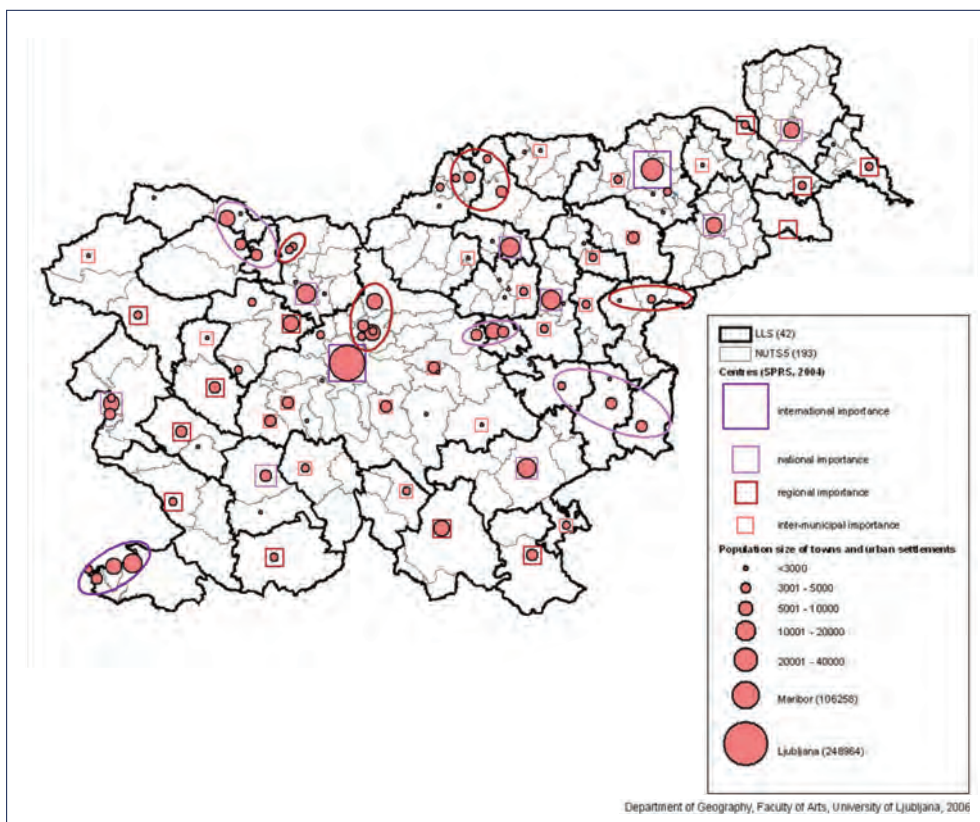
Table 19: Population of urban municipality, urban centre and its catchment area (NUTS 4, LLS) of Ljubljana (2002).

Urban municipality	Urban settlement	Urban area	NUTS 5	NUTS 4		LLS
More urban than rural population						
Ljubljana	247.772	249.442	265.881	323.200	Urban 267.815 Rural 55.385	523.221 (9 NUTS 4)

Sources: SURS; Kreitmayer McKenzie et al., 2008.

⁴⁰ With additional criteria that >20 % of the commuters daily migrates to work in that LLS.

Figure 36: Polycentric urban system of Slovenia: distribution of urban settlements, towns, LLS and their role as »centres of (inter)national, regional, intermunicipal importance« in Strategy of spatial development of Slovenia (2004).



Source: Kreitmayer McKenzie et al., 2008.

Figure 36 shows distribution of 42 LLS in Slovenia with their urban centres (and sub-centres) according to the number of inhabitants in officially defined 104 urban settlements (NUTS 7) of which 58 urban settlements have the status of a »town«, and their role in the polycentric urban system of Slovenia according to the Spatial Development Strategy of Slovenia (2004), defined as »centres of (inter)national, regional and inter-municipal importance« (together 51 centres with 64 urban settlements). The most complex is the largest LLS Ljubljana – metropolitan urban area with the dominance of the capital city of Ljubljana, with other small towns and/or city clusters (conurbations) which also serve as a local labour market for resident population in LLS Ljubljana. LLS Ljubljana is larger than Central Slovenian (or Ljubljana urban region) NUTS 3 region - for NUTS 4 Trebnje (south east from Ljubljana) and NUTS 4 Zagorje (east from Ljubljana), both located along the motorways, and therefore easily accessible from the city of Ljubljana, the most important employment centre in Slovenia.

9.5 Alternative characterizations of daily urban system Ljubljana

Using measures proposed by Van der Laan (1998) outward openness (OO) and inward openness (IO) of urban areas using commuting flows have been assessed. The »inward and outward openness« of urban areas take into consideration travel-to-work migrations between urban areas. For measuring the inward and outward openness of urban areas, the following formula is used:

$$OO = \frac{OUT - OUT_{reg}}{EA_{reg}}$$

OUT (sum of all working emigrants from NUTS 5 municipalities in LLS)

OUT_{reg} (sum of working emigrants from NUTS 5 municipalities within the same LLS)

EA_{reg} (number of active working population living and working in the same LLS)

and

$$IO = \frac{INC - INC_{reg}}{J_{reg}}$$

INC (sum of all working immigrants in NUTS 5 municipalities in LLS)

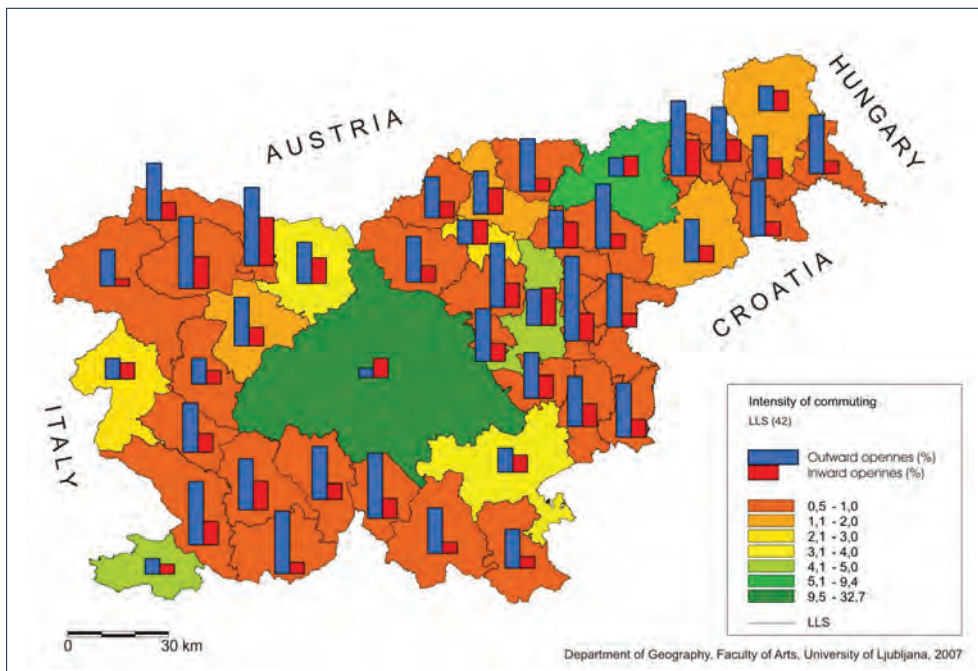
INC_{reg} (sum of all working immigrants from NUTS 5 municipalities within the same LLS)

J_{reg} (number of employees working in the same LLS).

Figure 37 shows distribution of jobs in each of 42 LLS as a share in total number of jobs in Slovenia and the proportion of the »inward and outward openness« of each LLS taking in consideration travel-to-work commuting to job (urban) centres in LLS.

In Slovenia most jobs are concentrated in LLS Ljubljana (32,7 %) and LLS Maribor (9,5 %), followed with the LLS: Coast (Koper-Izola-Piran), Celje, Kranj, Novo mesto, Velenje and Nova Gorica. The numbers of jobs in other 34 LLS areas are equally distributed, showing the polycentric structure of the urban system in Slovenia. The largest LLS Ljubljana, LLS Maribor, and LLS Coast (Koper-Izola-Piran) show relatively small values of »inward and outward openness« or daily commuting flows within 42 LLS areas – as most active working population living in these LLS are also employed in the same LLS, therefore travel-to-work migrations are occurring inside the same (large) LLS. The overall values of »outward openness« of most LLS are higher than »inward openness« of LLS showing the intensity of travel-to-work migrations from smaller LLS to larger LLS (regional centres) due to higher concentration of jobs in larger urban centres and suburbanisation tendencies towards neighbouring smaller LLS.

Figure 37: Distribution of jobs in 42 LLS (%) with »inward / outward openness«.



Source: Kreitmayer McKenzie et al., 2008.

Table 20: »Inward and outward openness« of 42 LLS in Slovenia.

LLS	outward openness %	LLS	outward openness %
Ljubljana	6,1	Škofja Loka	33,7
Obala	11,3	Krško	35,2
Maribor	12,6	Postojna	35,9
Nova Gorica	13,8	Šmarje pri Jelšah	37,0
Novo mesto	16,5	Radlje ob Dravi	37,1
Velenje	16,6	Cerknica	37,1
Murska Sobota	17,1	Zasavje	37,1
Idrija	18,0	Gornja Radgona	37,7
Celje	24,5	Brežice	38,2
Tolmin	24,5	Ormož	39,1
Slovenske Konjice	26,2	Jesenice	40,1
Črnomelj	26,7	Lendava	40,5
Ravne na Koroškem	28,6	Ilirska Bistrica	43,9
Kranj	29,3	Sevnica	44,1
Slovenj Gradec	29,5	Žalec	44,9
Ptuj	30,0	Slovenska Bistrica	45,1
Ljutomer	30,0	Ribnica	45,7
Sežana	31,5	Bled	49,7
Mozirje	31,7	Lenart	51,8
Kočevje	31,8	Radovljica	55,3
Ajdovščina	33,7	Šentjur pri Celju	59,1

Table 20: Continued

LLS	inward openness %	LLS	inward openness %
Tolmin	4,7	Zasavje	12,7
Obala	6,8	Ljubljana	12,9
Črnomelj	7,5	Ljutomer	13,6
Kočevje	7,9	Ribnica	13,8
Ilirska Bistrica	8,0	Murska Sobota	13,9
Lendava	8,8	Maribor	14,4
Radlje ob Dravi	8,8	Gornja Radgona	14,9
Idrija	9,0	Sežana	15,5
Šmarje pri Jelšah	9,3	Sevnica	16,3
Ormož	9,6	Krško	16,3
Slovenska Bistrica	10,4	Žalec	17,3
Nova Gorica	11,1	Velenje	17,3
Mozirje	11,2	Kranj	17,6
Cerkljica	11,3	Slovenske Konjice	17,9
Ravne na Koroškem	11,4	Slovenj Gradec	18,0
Ptuj	11,4	Šentjur pri Celju	19,3
Jesenice	11,5	Postojna	20,2
Novo mesto	11,6	Bled	22,2
Brežice	12,4	Lenart	25,1
Škofja Loka	12,7	Celje	26,3
Ajdovščina	12,7	Radovljica	33,6

Source: Kreitmayer McKenzie et al., 2008.

9.6 Conclusions

Our research results supported the idea of Ljubljana's daily urban system as lively and strong within Slovenia's overall commuting patterns. It represents the biggest Local Labour System in Slovenia with very high level of "self-sufficiency" as shown also by the values of "inward and outward openness" of the LLS Ljubljana. Strong daily urban system in one way shows the attractiveness of Ljubljana as a centre of employment for many living in the surrounding urban, suburban and rural areas. On the other hand increasing commuting brings also several negative effects to quality of life of residents of Ljubljana as well as those commuting, experiencing traffic congestions on a daily basis, air pollution, parking problems and costs, and also time spent for the commuting alone. The idea of balanced regional development which actually continues such a strategy since 1970s, is included also in the current Strategy of spatial development of Slovenia (2004). Hopefully the implementation of this strategy will keep the benefits of a strong and relatively well organized daily urban system of Ljubljana while minimizing its negative impacts on the development of Ljubljana, and on the quality of life of its population.

I 10. Daily urban system of Belgrade

Srboljub Stamenković, Dragica Gatarić

The explanation of the dominant characteristics of daily urban system of Belgrade, which represents the main functional knot of the Republic of Serbia by the functional capacity as well as by the spatial range of daily interaction of people, capital and information, we have based on studying the spatial-demographic and settlement aspects of daily migrations of labour, pupils and students. Both our and previous experiences in studying the phenomenon of daily migrations of the population in Serbia have been based exclusively or in the most of the cases on the field-work researches of daily circulations of people, its territorial framework and structural characteristics. Those researches have mainly local, sub-regional and regional character. As such, they enable the partial study of smaller daily urban systems. The scientific notions on daily urban systems and their function are modest because of that and mostly imbued by 'whiteness', if it can be said so. After all, it has been stated for many times in scientific discussions that the existing theoretical and empirical notions on population migrations, and also on daily migrations in geographical studies of the settlement net (Stamenković, 1996), are partial, insufficient and mainly imprecise, as well as that their study is handicapped by the imperfection of the theory (Petrović, Blagojević, 1989). Moreover, in science, as in the European and world relations (Gottmann, 1961; Berry, 1964; Lee, McDonald, 2003) so in the scientific researches in Serbia, the significance and the need of studying the phenomena of daily migrations of the population and daily (local) urban systems have been emphasized for many times (Stamenković, 1998; Tošić, Nevenić, 2007). From that point of view, there are many attempts in Serbia to form the reliable enough and precisely formulated fund of the scientific notions on daily migrations of population which is primarily relevant for the theory, methodology and practice of the spatial planning (Tošić, Krnić, 2005; Tošić, Stojanović, Miletić, 2005), as well as for other areas of the social practice by researches on smaller territorial and functional-organisational units, mostly terrain, but recently also by those researches based on the special statistical results processing of the population census (Stamenković, Gatarić, 2006; Stamenković, Gatarić, 2007; Lukić, 2006; Lukić, 2007).

In recent times, starting from the 2002 census, owing to the scientific collaboration of Faculty of Geography in Belgrade with Statistical Office of the Republic of Serbia in Belgrade, through the realization of the scientific project: Migrations of the Population of Serbia according to the 2002 census results - scope, structure, spatial directions and distribution, new possibilities are opened in Serbia for more complex and comprehensive understanding of the population migration as relevant social and spatial phenomenon, and in that context of daily migrations, too (Stamenković, 2004). Hence, the data formed by a special results processing of the 2002 population census of Serbia at the Statistical Office of the Republic of Serbia, which have not been published and available to broader scientific and expert public, represent the scientific-informative basis of this chapter.

The explanation of the main characteristics of daily urban system of Belgrade has been based on the analysis of the following settlement and spatial-demographic categories:

- mass and spatial distribution (by settlements and regions) of convergent daily migration of workers, pupils and students, or absorptive daily movements of labour, schoolchildren and youth;
- mass and spatial distribution (by settlements and regions) of divergent daily migration of workers, pupils and students, or by dispersive daily movements of labour, schoolchildren and youth;
- intra-urban daily movements of workers, pupils and students on the following routes: residence-place of work, residence-place of schooling, and vice versa.

We have established that the proportion of the convergent and divergent daily movements of Belgrade is 134.415 inhabitants, whereof 95.991 inhabitants or 71.4 % are workers, while others - 38.424 or 28.6 % belong to the category of pupils and students. Within the planned and formal borders of the settlement of Belgrade, 316.817 inhabitants commute daily (235.055 workers or 74.2 % and 81.762 pupils and students or 25.8 %) from residence to place of work, from residence to place of schooling, and vice versa. That practically means that daily urban system of Belgrade, if we disregard the periodical daily migrants whose number certainly exceeds the quantum of the continuous daily migrations, includes 451.232 inhabitants who commute daily in order to work or to acquire education. Taking into consideration that fact, it is certain that Belgrade represents the leading absorptive-dispersive centre of daily migration of labour, schoolchildren and youth, also including the intra-urban daily movements as they include 39.6 % of daily migration in Serbia⁴¹.

10.1. General characteristics of Belgrade and its daily urban system

Belgrade is a complex urban organism which can be differently explained in demographic, physiognomic, functional and administrative sense:

- as urban tissue with considerable area in its planned and formal borders, or as the Belgrade settlement;
- as urban territory in the narrower sense to which 10 urban municipalities belong, whereof six municipalities - 126 km² (Stari Grad, Vračar, Zvezdara, Savski Venac, Rakovica and New Belgrade) get into the structure of its continuous urban territory and have the status of the urban municipalities, while four municipalities - 904 km² (Voždovac, Čukarica, Palilula and Zemun), which, as well, represent the part of its urban tissue in the planned and formal borders, have the suburban rural-urban belt of 19 independent settlements (rural, mixed and urban)⁴²;

⁴¹ The total number of daily migrants-workers, pupils and students in Serbia without the territory of the AP of Kosovo and Metohija is 1.138.044 inhabitants.

⁴² Beli Potok, Zuce, Pinosava, Ripanj, Velika Moštanica, Ostružnica, Pecani, Rucka, Rušanj, Sremčica, Umka, Borča, Veliko Selo, Dunavac, Kovilovo, Ovča, Padinska Skela, Slanci and Ugrinovci.

- as administrative area of (community of municipalities) the City of Belgrade, or the metropolitan administrative area of Belgrade which includes the area of 3226 square kilometres with 17 municipalities, including 10 mentioned urban and 7 other municipalities - 2196 km² (Surčin, Grocka, Mladenovac, Sopot, Barajevo, Lazarevac and Obrenovac) which are the part of the suburban belt of the Belgrade settlement with 157 independent settlements or 2.6 % of the total number of the settlements of Serbia⁴³, whereof 14.9 % of the total population of Serbia is settled only in the Belgrade settlement.

Table 21: Total mass of daily migration in Belgrade.

Category	Workers	%	Pupils and students	%	Total	%
Convergent migrations	84.097	87,6	36.488	95,0	120.585	89,7
Divergent migrations	11.894	12,4	1936	5,0	13.830	10,3
Total	95.991	100,0	38.424	100,0	134.415	100,0

Source: Special statistical results processing of the 2002 population census, Statistical Office of the Republic of Serbia, Belgrade.

Daily interaction of Belgrade and the narrower and broader surroundings is characterized by the following relevant spatial-demographic characteristics (Stamenković, Gatarić, 2008):

- the convergent influences are territorially, settlement and demographically more expressed and prevailing (they are nine times larger than the divergent ones), because 1.6 % of the total population of the City of Belgrade participates in them in order to carry out the functions of labour or to acquire education (primary, secondary, college and university);
- the structural relationship of the convergent and divergent daily migration is 89.7 %:10.3 %;
- the structural relationship of labour, on one side, and pupils and students, on the other one, is 69.7 %:30.3 % of the convergent daily migration, while it is 86.0 %:14.0 % of the divergent one;
- the daily convergent and divergent gravitational influences of Belgrade considerably exceed the borders of the mother country, reaching many settlements, mainly larger, in the form of the lengthened spatial directions, in the broader encirclement of Serbia, on the territories of the former Yugoslav republics;
- 4.2 % of the total population of Serbia, without the Autonomous Province (AP) of Kosovo and Metohia, participates in the intra-urban daily movements of labour, school-children and youth.

10.2. Convergent and divergent daily movements

There are 120.585 inhabitants of the convergent daily movement, whereof 84.097 are workers and 11.894 are pupils and students. Daily migrant workers commute from

1150 settlements, while schoolchildren and youth commute from 1102 settlements on the territory of the AP of Vojvodina and central Serbia, but there are several hundreds of settlements wherefrom both daily migrant workers and pupils and students commute.

⁴³ There are 6155 independent settlements on the territory of Serbia.

Table 22: Spatial distribution of convergent daily migration of Belgrade.

Territory	Workers	Number of settlements	Pupils and students	Number of settlements	Total number of migrants	%
AP Vojvodina	15.301	236	9786	244	25.087	20,8
Central Serbia	68.796	914	26.702	858	95.498	79,2 ⁴⁴
AP Kosovo and Metohia	-	-	-	-	-	-
Total	84.097	1150	36.488	1102	120.585	100,0

Source: Special statistical results processing of the 2002 population census, Statistical Office of the Republic of Serbia, Belgrade.

The major mass of daily migrants towards Belgrade is from the settlements on the territory of central Serbia. The number of inhabitants of these daily movements is 95.498, whereof 68.796 are workers or 72.0 % who commute from 914 settlements, while 26.702 are pupils and students or 28.0 % who commute from 858 settlements. There are 25.087 migrants from the settlements of Vojvodina who realize the economic existence and acquire education in Belgrade (15.301 workers or 61.0 % and 9786 pupils and students or 39.0 %). Migrant workers commute from 236 settlements towards Belgrade (or from 50.5 % of the total number of the settlements in Vojvodina), and pupils and students from 244 settlements (or 52.2 % of the total number of the settlements in Vojvodina)⁴⁵.

Most migrant workers who commute to Belgrade are from the following settlements: Borča, (8556 migrants), Kaludjerica (6065), Sremčica (4483), Surčin (3233), Nova Pazova (2567), Pančevo (2397), Ripanj (2260), Leštane (2171), Novi Banovci (1858), Dobanovci (1764 migrants), etc., whereas pupils and students from Pančevo (3044 migrants), Borča (2643), Kaludjerica (1775), Sremčica (1461), Obrenovac (1239), Surčin (999), Nova Pazova (890), Mladenovac-town (818), Lazarevac (762), Smederevo (743 migrants), etc.

Among permanent inhabitants of Belgrade 13.830 are employed in 457 settlements or they acquire education in 95 settlements on the territory of Serbia and surrounding countries. It can be claimed with considerable certainty that many migrants who commute towards the settlements in the surrounding countries and cities do not belong to the category of daily migrants, but weekly, biweekly, monthly and similar categories. What is also evident is the higher proportion of migrants whose destination of labour or education is unknown (2784 migrants - 1962 workers or 70.5 % and 822 pupils and students or 20.1 %).

Table 23: Spatial distribution of divergent daily migration of Belgrade.

Territory	Workers	Number of settlements	Pupils and students	Number of settlements	Total number of migrants	%
AP Vojvodina	2775	102	479	27	3254	23,5
Central Serbia	6843	256	553	49	7396	53,5
AP Kosovo and Metohia	70	24	31	7	101	0,7
Other territories	244	75	51	12	295	2,1
Unknown	1962	-	822	-	2784	20,1
Total	11.894	457	1936	95	13.830	100,0

Source: Special statistical results processing of the 2002 population census, Statistical Office of the Republic of Serbia, Belgrade.

⁴⁴ Taking into consideration that the 2002 population census was not realized on the territory of the AP of Kosovo and Metohia, the data on the scope and distribution of the daily population migrations towards Belgrade from this part of the territory of Serbia are unknown, but it is indisputable that the daily, weekly, biweekly and monthly migrations prevail in a considerable number, especially those of the Serbian population.

⁴⁵ There are 467 permanent settlements on the territory of Vojvodina

The distribution of migrant workers has been the greatest towards the following settlements: Surčin (1285 migrants), Pančevo (1173), Grocka (686), Obrenovac (600), Vinča (374), Novi Sad (356), Lazarevac (329), Barajevo (273), Stara Pazova (255), Padinska Skela (251 migrants), etc., while pupils and students: Novi Sad (325 migrants), Kragujevac (129), Grocka (77), Nis (61), Barajevo (55), Pančevo (32), Kruševac (30), Valjevo (28), Blace (26), Stara Pazova (26), Sremska Kamenica (22 migrants), etc.

10.3. Regional distribution of daily migrants

Both the regional structure and the prevailing spatial directions of the circulation of the convergent and divergent daily migration of labour, schoolchildren and youth are various and include considerable area. Without going into details of meso- and micro-regional scopes, considering only macro-regional aspect, we have determined six areas (regional - geographical, political - geographical, administrative, etc.), different by the size of the territory, demographic and other characteristics: the City of Belgrade, the AP of Vojvodina, Pomoravlje (Veliko Pomoravlje, Zapadno Pomoravlje and Južno Pomoravlje), District of Šumadija, other territories of Serbia and adjoining countries. These areas can be designated as settlement-territorial and regional subsystems which are most intensively connected with the urban organism of Belgrade by daily interaction of labour, pupils and students. The parts of their territories, or the areas in their geographical entirety, represent the spatial and settlement-demographic framework of daily urban system of Belgrade.

The population from the settlements located on the territory of the City of Belgrade and the AP of Vojvodina is of dominant significance in the regional structure of the convergent daily migration. The proportions are 70.9 % and 20.8 % respectively in the total daily movements towards the Belgrade settlement. The proportion of other areas in Serbia is considerably lower and it is only 8.3 % of the total convergent daily migration. As it has already been mentioned, the population of the AP of Kosovo and Metohia has not participated in these movements, which certainly is not so, but the number is unknown.

Table 24: Regional distribution of convergent daily migration of workers, pupils and students of Belgrade.

Territory	Workers	Number of settlements	Pupils and students	Number of settlements	Total number of migrants	%
City of Belgrade	64.031	149	21.458	151	85.489	70,9
AP Vojvodina	15.301	236	9786	244	25.087	20,8
Pomoravlje	2715	374	2987	368	5702	4,8
• <i>Veliko Pomoravlje</i>	2081	105	1724	125	3805	3,2
• <i>Zapadno Pomoravlje</i>	275	107	1052	176	1327	1,1
• <i>Južno Pomoravlje</i>	359	162	211	67	570	0,5
Šumadija Region	333	43	441	47	774	0,6
Other territories	1717	348	1816	292	3533	2,9
Adjoining countries	-	-	-	-	-	-
Total	84.097	1150	36.488	1102	120.585	100,0

Source: Special statistical results processing of the 2002 population census, Statistical Office of the Republic of Serbia, Belgrade.

Table 25: Regional distribution of divergent daily migration of workers, pupils and students of Belgrade.

Territory	Workers	Number of settlements	Pupils and students	Number of settlements	Total number of migrants	%
City of Belgrade	5645	79	199	14	5844	42,3
AP Vojvodina	2775	102	479	27	3254	23,5
Pomoravlje	704	94	173	23	877	6,3
• <i>Veliko Pomoravlje</i>	313	27	25	7	338	2,4
• <i>Zapadno Pomoravlje</i>	223	30	42	7	265	1,9
• <i>Južno Pomoravlje</i>	168	37	106	9	274	2,0
Šumadija Region	104	11	134	2	238	1,8
Other territories	460	96	78	17	538	3,9
Adjoining countries	244	75	51	12	295	2,1
Unknown	1962	-	822	-	2 784	20,1
Total	11.894	457	1936	95	13.830	100,0

Source: Special statistical results processing of the 2002 population census, Statistical Office of the Republic of Serbia, Belgrade.

It is also certain that the settlements located on the territory of the City of Belgrade (42.3 %) and the AP of Vojvodina (23.5 %) have the prevailing significance in the divergent daily movements of the population, the share of which is 65.8 % of the total divergent daily interaction.

10.3.1. The City of Belgrade

In the settlement net of the City of Belgrade, there are 91.333 inhabitants who circulate daily in order to realize the functions of labour or to acquire education, which comprise 67.9 % of the total daily migration of the Belgrade settlement. The share of the convergent daily migrations is 85.489 persons (93.6 %), while it is 5844 inhabitants (6.4 %) of the divergent ones. The Belgrade settlement is connected with 154 settlements on the territory of the City of Belgrade over daily population migrations. Only two villages - Prkosava and Sakulja⁴⁶, located on the territory of the Lazarevac municipality, do not have daily connection with the Belgrade settlement (Stamenković, Gatarić, 2008).

The scope of the convergent daily migration of Belgrade is fifteen times larger than of the divergent one. There are 85.489 inhabitants (64.031 workers or 74.9 % and 21.458 pupils and students or 25.1 %) who commute daily to Belgrade in order to work or to acquire education (primary, secondary, college and university), whereof workers commute from 149 settlements, while pupils and students from 151 settlements. Other settlements (rural and mixed) are more active by migration towards Belgrade with 64.3 % of the total convergent daily migration in relation to the urban settlements of the City of Belgrade with 35.7 % of the total convergent daily migration of labour, schoolchildren and youth.

In order to get more complete idea about the level of spatial-demographic expressiveness of daily migrations of labour towards Belgrade, and in the deficiency of the reliable data on this social phenomenon, we cite that the present mass of daily migrations of labour is 3.2 times larger in Belgrade than the same of the 1970s in Zagreb. At that time, Zagreb was "known as the strongest gravitational centre of Yugoslavia concerning daily migrations of labour", to which "around 20.000 persons come to work" (Marković, 1972).

⁴⁶ The population of the village of Sakulja was moved to the territories of the Lazarevac municipality due to the expansion of the lignite strip mining (»Polje D«), but in spite of that the settlement is registered at the Systematic list of settlements of the Republic of Serbia (Statistical Office of the Republic of Serbia, Belgrade, 2002) and it is statistically noted (Stamenković, 2004).

Table 26: Territorial distribution of convergent daily migration within the City of Belgrade.

Type of settlement	Workers	Number of settlements	Pupils and students	Number of settlements	Total number of migrants	%
Urban	21.709	17	8771	17	30.480	35,7
Other	42.322	132	12.687	134	55.009	64,3
Total	64.031	149	21.458	151	85.489	100,0

Source: Special statistical results processing of the 2002 population census, Statistical Office of the Republic of Serbia, Belgrade.

Table 27: Spatial distribution of divergent daily migration within the City of Belgrade.

Type of settlements	Workers	Number of settlements	Pupils and students	Number of settlements	Total number of migrants	%
Urban	3738	15	135	9	3873	66,3
Other	1907	64	64	5	1971	33,7
Total	5645	79	199	14	5844	100,0

Source: Special statistical results processing of the 2002 population census, Statistical Office of the Republic of Serbia, Belgrade.

As it has already been mentioned, the territorial framework and demographic expressiveness of daily dispersion of labour, pupils and students-domicile inhabitants of Belgrade are not highly dominant. The share of inhabitants in the divergent daily movements is 5844 or 0.5 % of the total population of Belgrade (5645 workers or 96.6 % and 199 pupils and students or 3.4 %). Workers, who mainly travel towards other settlements (rural and mixed), commute daily from Belgrade to 79 settlements, whereof 15 settlements are urban, while pupils and students, whose destinations are mainly urban settlements, travel to 14 settlements.

The number of daily migrants from the settlements of the City of Belgrade territory is different. It ranges from 11.199 inhabitants from the suburban area of Borča to only one migrant from several settlements. According to the scope and frequency of the convergent daily migration, five groups of the settlements can be distinguished on the territory of the city of Belgrade.

The group of 25 settlements stands out by its strengthened convergent daily interaction of labour, pupils and students (Borča, Kaludjerica, Sremčica, Surčin, Obrenovac, Leštane, Ripanj, Dobanovci, Vrčin, Padinska Skela, Ugrinovci, Barajevo, Mladenovac-town, Jakovo, Vinča, Boleč, Barič, Rušanj, Beli Potok, Ostružnica, Grocka, Umka, Bečmen, Lazarevac and Boljevci) wherefrom more than 1000 daily migrants commute respectively. The proportion of this group is 65.837 daily migrants or 77.0 % of the total convergent daily migration.

The group of 21 settlements is also significantly connected with the Belgrade settlement (Pinosava, Vranić, Velika Moštanica, Ovča, Ralja, Zvečka, Zuce, Guncati, Ritopek, Meljak, Zaklopača, Progar, Mala Ivanča, Slanci, Umčari, Mislodjin, Mala Moštanica, Petrovčić, Veliko Selo, Popović and Bačevac) out of which from 313 to 975 daily migrants commute respectively. The share of this group of the settlements is 10.533 migrants or 12.3 % of the total convergent daily migration.

The group of 39 settlements also represents the considerable daily connection with the Belgrade settlement (Mali Pozarevac, Kovacevac, Begaljica, Stubline, Ropocevo, Kovilovo, Drazanj, Bozdarevac, Vlaska, Skela, Veliki Borak, Zabrezje, Stepojevac, Pudarci, Veliki Crljeni, Sopot, Lisovic, Nemenikuće, Djurinci, Veliko Polje, Jagnjilo, Parcani, Drazevac, Beljina, Grabovac, Medjuluzje, Granice, Rvati, Rajkovac, Belo Polje, Koracica, Pecani, Rabrovac, Kamendol, Brestovik, Siljakovac, Vrbovno, Mladenovac-village and Velika Krsna) out of which from 100

to 296 daily migrants commute respectively. The share of this group is 6606 migrants or 7.7 % of the total convergent daily migration.

About 52 to 99 daily migrants commute to Belgrade from 24 settlements (Sepsin, Dunaovac, Arnajevo, Senaja, Piroman, Stojnik, Amerić, Vreoci, Baljevac, Rogača, Manić, Leskovac, Rožanci, Ducina, Sibnica, Ljubinić, Trstenica, Brović, Konatice, Urovci, Krtinska, Šopic and Dren near Obrenovac). The share is 1641 migrants or 1.9 % of the total convergent daily migration.

The group of 45 settlements has the weakest intensity of the daily connection with the Belgrade settlement, wherefrom less than 50 daily migrants commute respectively, while nine settlements of this group (Stubica, Cvetovac, Strmovno, Šušnjar, Beljevac, Bistrica, Dren near Lazarevac, Burovo and Lukovica) have from one to four daily migrants. The share is 872 daily migrants or 1.0 % of the total convergent daily migration.

The most expressive daily dispersion of labour, schoolchildren and youth of the Belgrade settlement on the territory of the City of Belgrade is towards the settlements whereto more than 100 migrants commute. There are 14 such settlements (Surčin, Grocka, Obrenovac, Vinča, Lazarevac, Barajevo, Padiška Skela, Sopot, Dobanovci, Borča, Mladenovac-town, Ripanj, Barič and Jakovo) which absorb 84.7 % of the total divergent daily migration of the Belgrade settlement.

Intra-urban daily movements of labour, pupils and students – Within the planned and formal borders of the urban tissue of Belgrade, 28.3 % of the total population of the Belgrade settlement circulates daily from residence to place of work, from residence to place of schooling, and vice versa.

Among the urban municipalities of Belgrade, New Belgrade (47.004 workers), Čukarica (30.031 persons), Zvezdara (29.664 inhabitants) and Voždovac (29.466 persons) have the highest dispersion of labour, whereas Savski Venac (53.555 workers), Stari Grad (50.423 persons), New Belgrade (26.980 inhabitants) and Palilula (23.887 persons) have the highest absorption.

Table 28: Convergent and divergent daily movements of labour among the urban municipalities within the urban tissue of Belgrade.

Convergent movements	Divergent movements ⁴⁷										Total
	Vo	Vr	Zv	Ze	NB	P	R	SV	SG	C	
Voždovac		1 001	2 829	1 607	3 441	1 591	2 181	738	680	2 147	16 215
Vračar	2 891		2 938	1 644	3 808	1 919	1 665	814	1 118	2 394	19 191
Zvezdara	2 390	935		1 142	2 347	1 943	1 180	489	632	1 383	12 441
Zemun	1 831	685	1 720		7 344	1 247	1 334	619	726	2 008	17 514
New Belgrade	3 799	1 703	3 395	6 332		2 552	2 387	1 337	1 659	3 816	26 980
Palilula	3 219	1 547	4 328	2 176	4 816		2 109	992	1 733	2 967	23 887
Rakovica	716	142	394	297	656	281		169	127	1 445	4 227
Savski Venac	7 105	3 161	5 963	5 054	11 525	4 378	5 808		2 721	7 840	53 555
Stari Grad	6 146	3 280	6 757	5 273	11 029	5 747	4 114	2 234		5 843	50 423
Čukarica	1 162	415	981	763	1 744	757	2 214	374	320		8 730
Unknown	207	58	359	349	294	225	84	46	82	188	1 892
Total	29 466	12 927	29 664	24 637	47 004	20 640	23 076	7 812	9 798	30 031	235 055

Source: Special statistical results processing of the 2002 population census, Statistical Office of the Republic of Serbia, Belgrade.

⁴⁷ The abbreviations for the urban municipalities: Vo-Voždovac, Vr-Vračar, Zv-Zvezdara, Ze-Zemun, NB-New Belgrade, P-Palilula, R-Rakovica, SV-Savski Venac, SG-Stari Grad and C-Čukarica.

Table 29: Convergent and divergent daily movements of pupils and students among the urban municipalities within the urban tissue of Belgrade.

Convergent movements	Divergent movements										Total
	Vo	Vr	Zv	Ze	NB	P	R	SV	SG	C	
Voždovac		709	1659	947	2252	833	979	467	522	1218	9586
Vračar	685		764	234	726	497	293	256	375	375	4205
Zvezdara	1151	512		869	1596	917	691	300	375	920	7331
Zemun	451	132	476		2717	333	340	165	155	584	5353
New Belgrade	339	198	303	1008		327	203	150	245	447	3220
Palilula	1553	1341	2201	1248	3393		1046	758	1145	1641	14.326
Rakovica	216	27	71	45	80	35		63	19	967	1523
Savski Venac	1759	925	1553	1512	3270	1106	1405		921	1862	14.313
Stari Grad	2006	1195	2205	1860	4521	2017	1311	871		2132	18.118
Čukarica	307	154	287	300	606	250	641	175	128		2848
Unknown	149	19	156	137	152	135	40	16	43	92	939
Total	8616	5212	9675	8160	19.313	6450	6949	3221	3928	10.238	81.762

Source: Special statistical results processing of the 2002 population census, Statistical Office of the Republic of Serbia, Belgrade.

Within the intra-urban daily movements of schoolchildren and youth, New Belgrade (19.313 pupils and students), Čukarica (10.238 schoolchildren and youth), Zvezdara (9675 persons) and Voždovac (8616 inhabitants) have the highest dispersion, whereas Stari Grad (18.118 pupils and students), Palilula (14.326 schoolchildren and youth), Savski Venac (14.313 persons) and Voždovac (9.586 inhabitants) have the highest absorption.

10.3.2. Autonomous Province of Vojvodina

The number of daily migrants who circulate the Belgrade - the Vojvodina settlements route and vice versa, is 28.341 or 21.1 % of the total daily migration of the city (Stamenković, Gatarić, 2008).

The number of migrants of the convergent daily migration is 25.087, whereof 15.301 are workers, and 9786 are pupils and students. The number of migrants of the divergent daily migration is 3254 (2775 workers and 479 pupils and students). The proportions of these daily migrations are 0.3 % of the total population of Belgrade and 1.2 % of the total population of AP of Vojvodina, or 0.4 % of the total population of Serbia without the AP of Kosovo and Metohia.

The daily interaction of Belgrade and the settlements of Vojvodina is characterised by the following relevant spatial-demographic characteristics:

- the convergent impacts of Belgrade are territorially, settlement and demographically more expressive and prevailing;
- the structural proportion of the convergent and divergent daily migration of Belgrade is 88.5:11.5 %;
- the structural proportion of labour, on one side, and pupils and students, on the other, is 61.0:39.0 % of the convergent daily migration, while it is 85.3:14.7 % of the divergent one and
- the spatial-functional connection of Belgrade with the settlements of Vojvodina by the convergent and divergent daily migrations of labour, pupils and students is con-

siderable because the city is connected with 303 settlements of Vojvodina⁴⁸, or 64.88 % of the settlements of the AP of Vojvodina is included by this interaction.

Evidently, the convergent daily gravitational area of labour, pupils and students of Belgrade on the territory of Vojvodina is territorially, settlement and spatially more expressive than the divergent one. Although Belgrade has more workers than pupils and students by the convergent daily migrations, its daily school area in the AP of Vojvodina is more spread than the area of labour because pupils and students commute daily from 244 settlements of Vojvodina, while workers from 236 settlements.

The Belgrade divergent daily area of labour, schoolchildren and students on the territory of the AP of Vojvodina includes 102 settlements whereto migrant workers commute and 27 settlements whereto daily migrant pupils and students travel.

The settlements of the convergent and divergent commuting flows are distributed in all parts of the Vojvodina province, on the territory of 45 municipalities of Vojvodina.

Most daily migrant pupils commute to Belgrade from the urban settlements in the AP of Vojvodina (59.6 % of the total convergent daily migration of pupils and students), while workers commute from other settlements (62.4 % of the total convergent daily migration of labour). The convergent daily migration of pupils is realized from 49 urban settlements, while of workers from 47 towns of Vojvodina. The population from the urban settlements of Ada, Bač, Bački Petrovac, Mol and Srbobran does not participate in the daily movements of labour towards Belgrade, while the population from Bački Petrovac, Bеојчин and Čока does not participate in the daily movements of schoolchildren and youth.

Table 30: Convergent and divergent daily migrations of workers, pupils and students of Belgrade by statistical types of settlements in 2002.

Type of settlement	Convergent daily migrations			Divergent daily migrations			Total migrants
	Workers	Pupils and students	Total	Workers	Pupils and students	Total	%
Urban	5755	5834	11.589	2367	461	2828	14.416
Other	9546	3952	13.498	408	18	426	13.925
Total	15.301	9786	25.087	2775	479	3254	28.341

Source: Special statistical results processing of the 2002 population census, Statistical Office of the Republic of Serbia, Belgrade.

Workers, pupils and students, the permanent residents of Belgrade, mostly travel regularly to the urban settlements of Vojvodina in order to work or acquire education, which comprises 86.88 % of the total divergent daily migration of the city. Daily migrant workers commute from Belgrade to 43 urban settlements, while pupils and students commute to 18 urban settlements in the AP of Vojvodina.

The intensity of daily interaction between Belgrade and the settlements of Vojvodina has diversified spatial-demographic and settlement expressiveness. The share of the convergent and divergent migrations is 10 or even fewer daily migrants from 202 settlements (43.25 % of the Vojvodina settlements). There are 674 migrants from these settlements

⁴⁸ On the territory of the AP of Vojvodina, 467 permanent settlements are located or 7.59% of the total number of the settlements of Serbia.

(2.38 % of the total daily migration between Belgrade and the settlements of Vojvodina). On the other side, 27.667 migrants (97.62 %) belong to the group of 101 settlements which, as well, make the daily urban system of Belgrade on the territory of the AP of Vojvodina.

Over the convergent daily migrations of labour, pupils and students, Belgrade is most intensively connected with 10 following settlements of Vojvodina: Pančevo, Nova Pazova, Novi Banovci, Stara Pazova, Indjija, Stari Banovci, Kačarevo, Opovo, Šimanovci and Novi Sad. The convergent flow of this group of settlements is 16.631 migrants, or 66.29 % of the total convergent daily migration.

The residents of Belgrade mainly commute daily to Pančevo, Novi Sad, Stara Pazova, Nova Pazova, Vršac, Subotica, Indjija, Kovin, Zrenjanin, Pećinci, Ruma, etc. in order to work or to acquire education. The divergent flow of these settlements is 2751 migrants, or 84.54 % of the total divergent daily migration.

10.3.3. Pomoravlje

The number of daily migrants who circulate between the Belgrade and the Pomoravlje settlements is 6579 or 4.9 % of the total daily migration of labour, schoolchildren and youth of Belgrade.

The total number of daily migrants from Pomoravlje, the largest geographic region of central Serbia - Veliko, Južno and Zapadno Pomoravlje, is 5702 migrants, whereof

2715 are workers (47.7 %), and 2987 are pupils and students (52.3 %). The distribution of daily migrant workers is realized from 374 settlements, while pupils and students from 368 settlements. The number of daily migrants from Belgrade is 877 (704 workers and 173 pupils and students), while workers commute to 94 settlements, and pupils and students to 23 settlements.

The most frequent daily migrations are from Veliko Pomoravlje, wherefrom 3805 migrants commute, which comprises 2.8 % of the total mass of the convergent daily migration of Belgrade, whereof 2081 are workers (54.7 %) and 1724 are pupils and students (45.3 %). There are 338 daily migrants who commute from Belgrade to certain settlements of Veliko Pomoravlje (313 workers and 25 pupils and students). Workers commute to 27 settlements, while pupils and students to 7 settlements.

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The more intensive daily migrations are from the territory of the Smederevska Palanka municipality where 1150 migrant workers commute from 14 settlements (Kusadak - 10 migrants, Ratari - 226, Smederevska Palanka - 141, Glibovac - 28 migrants, etc.), while the divergent daily migrations of migrant workers are mainly towards Smederevo (118 daily migrants).

There are 1327 daily migrants from Zapadno Pomoravlje, which comprises 1.0 % of the total mass of the convergent daily migration of Belgrade, whereof 275 are workers from 107 settlements (from Kraljevo - 32 migrants, Cacak - 26, etc), while 1052 are pupils and students from 176 settlements (from Cacak - 197 migrants, Krusevac - 184, Kraljevo - 104, etc). The residents of Belgrade, 265 of them (223 workers and 42 pupils and students), commute daily to several settlements of Zapadno Pomoravlje (workers to 30 settlements and pupils to 7 settlements), among which, by the scope of migration, Kruševac (28 workers and 30 pupils and students), Gornji Milanovac (39 workers and two pupils), Čačak (31 workers and 3 students), Užice (30 workers and 3 pupils and students), etc. stand out.

The total number of daily migrants from the settlements of Južno Pomoravlje, under which it is meant on Južno Pomoravlje in its broader sense, because we have adjoined Ponisavlje, Vlasina, Jablanica, Toplica and Kosovsko Pomoravlje, is 570 (359 workers and 211 pupils and students), which comprises 0.5 % of its total convergent daily migration, whereof workers commute from 162 settlements (Nis - 55 workers, Prokuplje - 18, Pukovac - 13, etc), and pupils and students from 67 settlements (Nis -29 migrants, Pirot - 24, Prokuplje - 20, etc). The number of daily migrants from Belgrade is 274 (168 workers and 106 pupils and students). Workers commute to 37 settlements (Nis - 38 migrants, Vranje - 21, Leskovac - 21, Prokuplje - 11, etc), while pupils and students to 9 settlements (Nis - 61 migrants, Blace - 26, Vranje - 10, etc).

10.3.4. District of Šumadija

The daily circulation of migrants between Belgrade and the settlements of the Šumadija district (2387 km² and 175 settlements) and vice versa, is 1012 migrants or 0.8 % of the total daily migration of labour, schoolchildren and youth of Belgrade.

The number of migrants of the convergent daily migration is 774 (333 workers and 441 pupils and students), while the number of migrants of the divergent daily migration is 238 (104 workers and 134 pupils and students). The distribution of the convergent daily migration of labour is realized from 43 settlements (Kragujevac - 89 migrants, Arandjelovac - 61, Lapovo - town, 47, Stojnik near Arandjelovac - 44 workers, etc), while of schoolchildren and students from 47 settlements (Arandjelovac - 186 migrants, Kragujevac - 120, Topola - town, 23, Batocina - 16 migrants, etc.). Daily migrant workers commute from Belgrade to 11 settlements (Kragujevac - 44, Arandjelovac 34, Topola - town, 12 migrants), while pupils and students commute to 2 settlements (Kragujevac 129 and Arandjelovac 5 pupils and students).

10.3.5. Other territories of Serbia

There are 4071 daily migrants who circulate the Belgrade - other parts of Serbia route and vice versa, which is 3.0 % of the total daily migration of Belgrade.

The share of the convergent migrations is 1717 workers and 1816 pupils and students, whereas the share of the divergent ones is 460 workers and 78 pupils and students. Most daily migrant workers commute from Šabac (129 migrants), Valjevo (98 migrants), Ub (63 migrants) and Lajkovac - town (54 migrants), while pupils and students commute

from Šabac (321 migrants), Valjevo (295 migrants) and Loznica (95 migrants). Most daily migrant workers commute to Valjevo (43 migrants), Šabac (40 migrants), Lajkovac - town (33 migrants) and Ub (28 migrants), while pupils and students commute to Valjevo (28 migrants), Šabac (7 migrants), etc.

10.3.6. Adjoining countries

The permanent residents of Belgrade are employed or they acquire education in the adjoining countries, i.e. in the former Yugoslav republics. The share of these daily migrations is 244 workers and 51 pupils and students, or 2.1 % of the total divergent daily migration of Belgrade: towards Montenegro (157 migrants), Bosnia and Herzegovina (94 migrants), Croatia (30 migrants), Macedonia (6 migrants) and Slovenia (8 migrants). The most frequent daily connections are towards Podgorica (57 migrants), Kotor (18 migrants), Banja Luka (13 migrants), Bijeljina (12 migrants), Nikšić (12 migrants), Cetinje (11 migrants), Zemunik Donji and Zabjani in Croatia (4 migrants each), etc.

10.4. Conclusions

The following relevant conclusions have resulted from many, here presented, facts, which make the starting point of our further more universal and detailed studies of the daily population migrations and daily urban systems in Serbia:

- the used data fund on the convergent and divergent daily population migrations of Belgrade and surrounding settlements, formed by the special statistical results processing of the 2002 population census, enables the reliable study of the quantity and quality of the spatial-functional relationships and connections in the settlement net, as of Belgrade so of the broader territory in its functional encirclement;
- by the scope of the convergent and divergent daily migration, which comprises 1.8 % of the total population of Serbia without the territory of the AP of Kosovo and Metohia, as well as by other important indicators (number of employed, number of pupils and students, the share in the national income, etc) of the functional significance, Belgrade represents the leading centre of Serbia which, by its absorbent and dispersive gravitational strength, influences greatly the integration and transformation of the settlements on the considerable territory;
- the daily urban system of Belgrade is spatially, settlement and demographically developed and involved into many regional directions (the Belgrade suburban; Vojvodina: Podunavlje, Srem, etc.; Pomoravlje: Velika Morava, Južna Morava and Zapadna Morava; Sumadija, etc), and also:
- it unites and connects, spatially and functionally, the considerable territory and many regional, sub-regional and local systems of settlements;
- the convergent gravitational area of labour includes 1150 settlements and 84.097 daily migrants, whereas the divergent one includes 457 settlements and 11.894 daily migrants and
- the convergent area of pupils' and students' daily migration includes 1 102 settlements and 36.488 daily migrants, while the divergent one includes 95 settlements and 1936 daily migrant pupils and students;

- the daily interaction of the Belgrade settlement (convergent and divergent) is the most developed within the City of Belgrade, especially with the settlements in its suburban belt;
- the settlements situated on the territory of Vojvodina, Pomoravlje and other regional wholes in Serbia stand out by the intensity of daily connection with Belgrade and
- the intra-urban daily migrations of labour, schoolchildren and youth on the residence-place of work, residence-place of schooling routes, and vice versa, are of special significance in the realization of the function and development of daily urban system of Belgrade in the broader sense, which have been treated, in this chapter, on the level of the general characteristics and about which we are going to discuss on some other occasion.

11. Social urban geography of Ljubljana

Dejan Rebernik, Marko Krevs

Cities are heterogeneous with respect to the social composition of their populations. We take social structure to mean the spatial distribution of particular social groups of the population and the differences arising from it in the social composition of the population of different parts of the city. Uneven spatial distribution of different social groups can also be termed spatial social segregation. Since the basis for the spatial social segregation of the population is the place of residence, we can also refer to residential social segregation; segregation can be seen also in education, employment, and social networks.

The social structure of the city is primarily a reflection of the more general social stratification of society. The social stratification of Slovenian society is, according to the findings of sociologists, comparable to conditions in western European countries. During the time of the economic transition in the 1990s, social differences in the population increased, but nevertheless in the European context Slovenia is ranked among countries with relatively small social differences. This is also shown by the socioeconomic stratification, or the income classes based on the methodology of the Institute for Macroeconomic Analysis and Development (Socialni razgledi, 2006, 16). The shares of people in the lower and upper income classes are relatively small, and a large majority of the population, about 85 %, fall in the middle income bracket. The level of risk of poverty was estimated at 10 % for 2003, which gives Slovenia the second lowest risk of poverty in the European Union. Between 1998 and 2002 there was a continued reduction of social inequality, since the level of risk of poverty dropped from 11.8 % to 10.0 %. In this connection it should be stressed that the population under the previous socialist socioeconomic system was also socially stratified. Differences in income among particular occupations and classes of population were limited, but they were in no way negligible. It is clear from an analysis of the social geography of Ljubljana in 1991 that at the end of the “socialist” period there was present a moderate social segregation of the population (Rebernik, 2002).

Table 31: Income distribution in Slovenia in 1998 and 2002.

Income class	1998		2002	
	Persons (%)	Income (%)	Persons (%)	Income (%)
Lower	14.0	6.1	11.9	5.3
Lower middle	54.1	4.1	55.0	38.3
Upper middle	26.9	36.5	28.2	38.3
Higher	5.1	12.2	4.9	11.1

Source: Socialni razgledi 2006, 17.

In this chapter we attempt to provide answers to some basic questions: What are the main characteristics of spatial social segregation in Ljubljana? Which factors influenced the present-day social geography of the city? Is social segregation of the city a reflection of the general social stratification of society? Is the social geography of Ljubljana in keeping with the theoretical underpinnings of urban geography and comparable to condi-

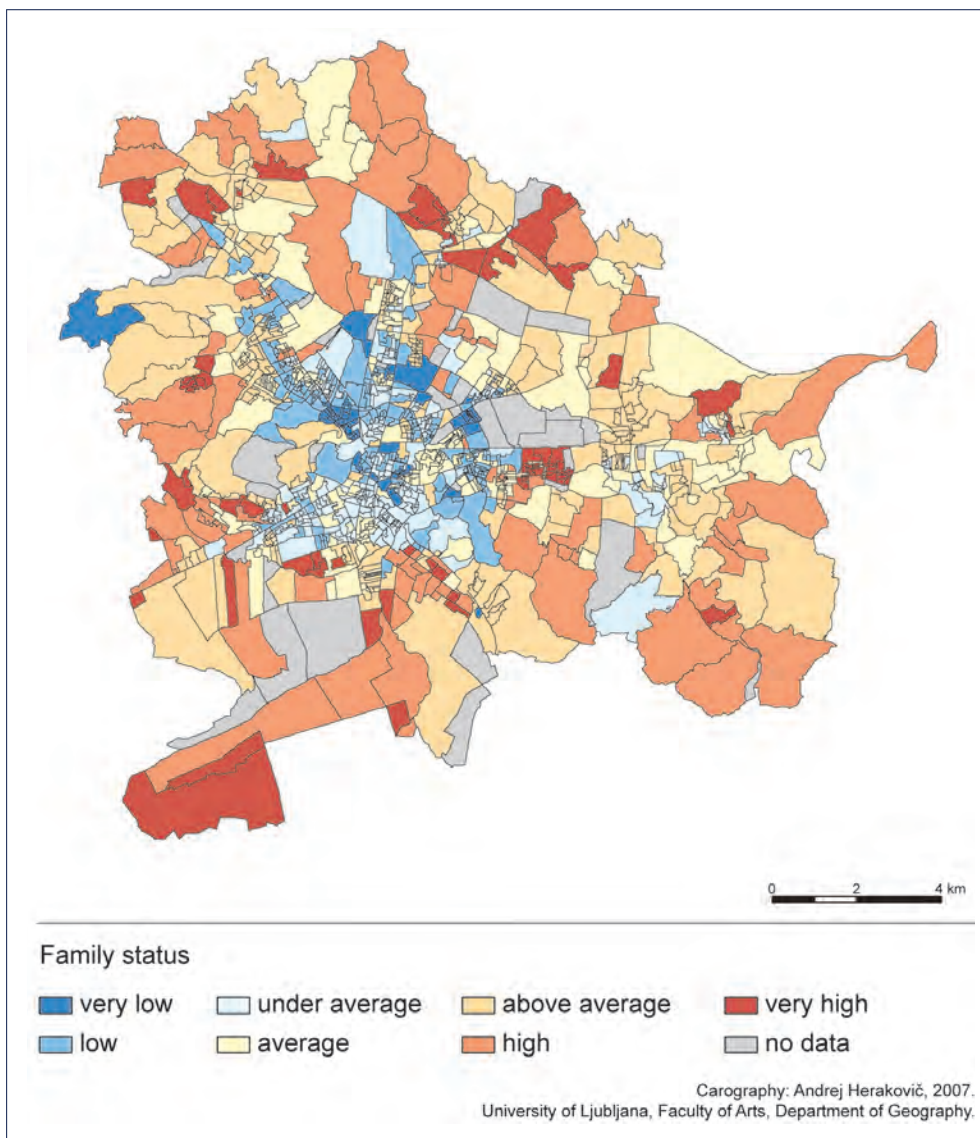
tions in European cities? Is the social geography of Ljubljana undergoing a pronounced transformation, and which processes of social transformation are most important? To what extent do the housing market, national housing policy, and the attitude of the population to the living environment influence the social structure and transformation of the city? Can we identify and spatially delimit characteristic and specific social areas in the case of Ljubljana?

The study of the social composition and transformation of the city is based on an analysis of data from the 2002 population census. The basic method used was an analysis of the educational, income, and age structure of the population in the territory of the Urban Municipality of Ljubljana based on a comparison of the share of selected population groups in the former local communities. Local communities were a form of local self-management that were replaced with neighborhood or district communities with the local self-management reforms. We selected local communities as the basic spatial unit since their size and spatial extent is very well suited to our study. Due to their pronounced non-urban nature the area of the former local communities Besnica and Lipoglav were excluded from the analysis. A comparison of the census data from 1981, 1991 and 2002 enabled an outline of the basic processes of social transformation of the city. The results of a study of the social structure of Ljubljana using factor analysis performed on census data from 1991 (Rebernik, 1999) were also used. The main features of social structure thus obtained are placed in the context of general socioeconomic and spatial processes. In this connection the influences of the operation of the housing market and housing and urban planning policy were highlighted. A categorization of the city into social areas represents a synthesis of the findings from particular phases of the study.

Factor analysis, along with similar methods, has become the preferred and most commonly used approach for measuring urban social spatial differences. It is an inductive procedure for the analysis of a wide specter of social, economic, demographic and housing characteristics of an urban space with the goal of determining a common pattern for the social structure of cities. Factor analysis makes possible the identification of common factors, i.e. new, hybrid variables, which exemplify the complexity of the variability of the originally measured variables. It involves a series of mathematical-statistical procedures which make it possible for a larger number of correlated variables to determine a smaller number of basic variables which explain the correlation. These are called common factors. In the case of studying cities, the original observed variables are data on the social, economic, demographic, and ethnic composition of the urban population according to certain spatial units, usually census districts or areas. The factors are defined in terms of content using factor weights, which are coefficients of the correlation between the original variables and the common factors. The study of the case of Ljubljana (Rebernik, 1999) included variables on the income, occupational, educational, ethnic and age structure of the population and the structure of households and standard of housing. It turned out that a large degree of the variance can be explained by three common factors: the socioeconomic, family and ethnic status of population. The socioeconomic status of the population is determined by the educational and occupational structure and the income of inhabitants. The family status of the population is determined by the age structure of the population and the structure of households. The ethnic status of the population is a reflection of the national and religious structure of the population. The social structure of Ljubljana is thus reflected in the socioeconomic, family or demographic, and ethnic or

national-religious differentiation of the population, and fits in well with the theoretical model of factorial ecology. The spatial distribution also follows the theoretical underpinnings of factor ecology: the socioeconomic position of the population has a sectoral distribution, the family position a concentric one, and the ethnic position a multi-nuclear one. Figure 38 thus shows the family status of population, where low family status corresponds to high share of small and old households and high family status to high share of families with children. Below we present the characteristics of socioeconomic and ethnic segregation of the population in more detail.

Figure 38: Factorial analysis, family status of population, Urban Municipality of Ljubljana, 1991.

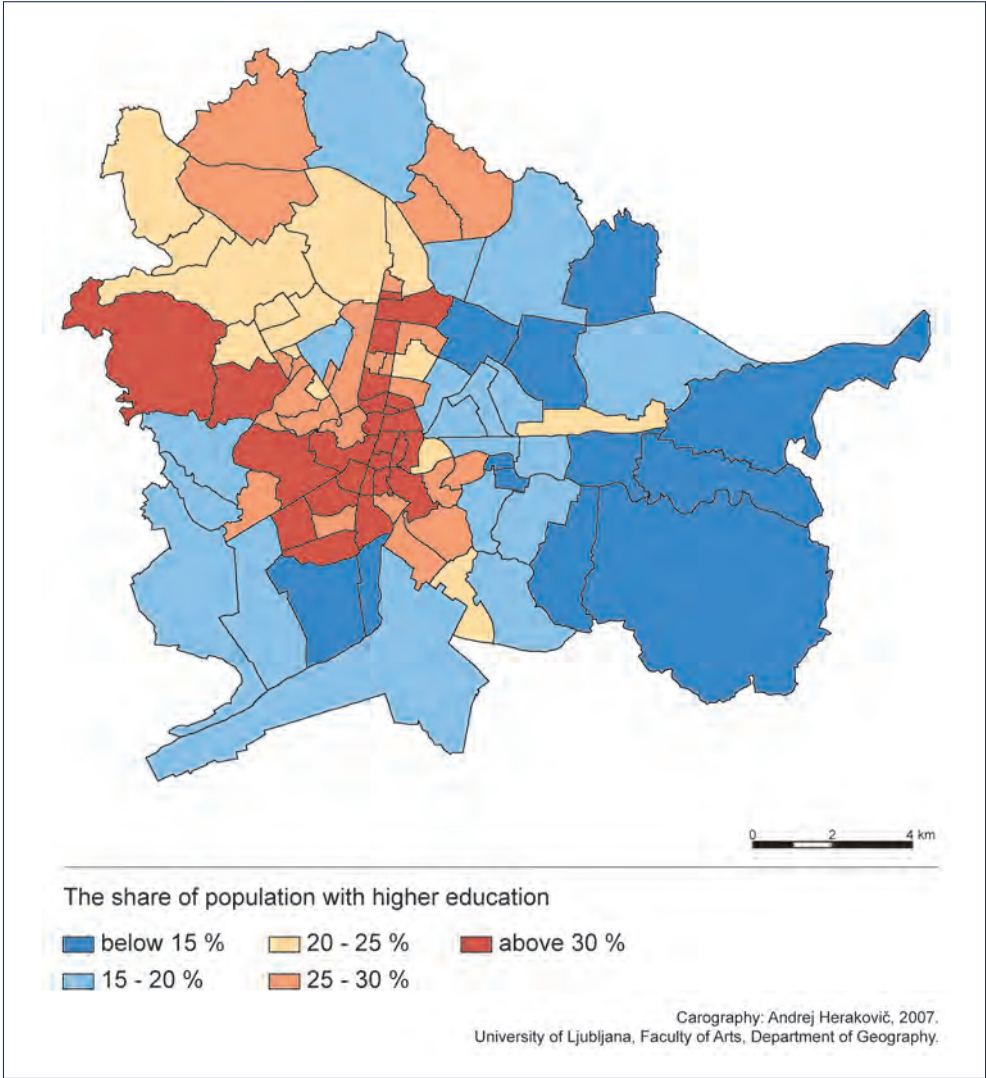


Source: Rebernik, 1999.

11.1. Socioeconomic segregation

Using factor analysis based on census data from 1991 (Rebernik, 2002), the study showed that the greatest part of the variance of the original variables which were included can be explained by the factor socioeconomic status of the population. From this we can conclude that the social structure of Ljubljana is influenced to the largest extent by differences in the socioeconomic position of the population in particular parts of the city. An analysis of socioeconomic segregation of the population based on census data from 2002 showed no major changes compared to the situation in 1991, but that due to the privatization of socially owned housing and the formation of a housing market and accelerated housing construction for the market there was some increase in socioeconomic segregation.

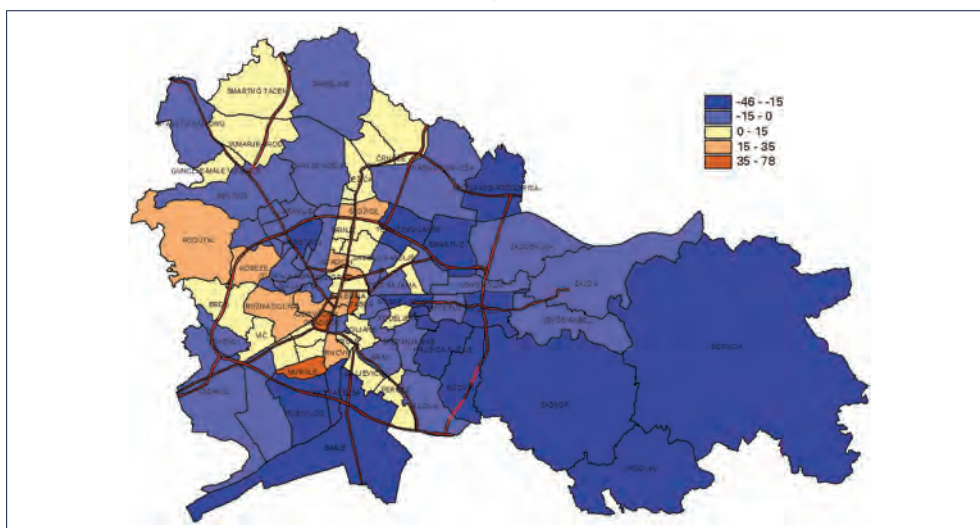
Figure 39: The share of population with higher education, Urban Municipality of Ljubljana, 2002.



Source: 2002 Population Census, Statistical Office of the Republic of Slovenia.

A large part of the city has a relatively average and heterogeneous socioeconomic composition of the population. However, within areas with an average socioeconomic composition, there were characteristic large differences in the socioeconomic status of the population over a small distance, for example between individual apartment buildings. This is, for example, highly characteristic of the old city center and particular neighborhoods of blocks of apartments. These are areas with a highly heterogeneous social composition of the population which is primarily a result of the urban planning, population development of the city over the entire postwar period, and of the low social stratification of the population under the previous socioeconomic system. The operation of the housing market and the spatial mobility of the population within the city were limited up until 1990, which impeded the spatial social differentiation of the city. This was connected with strong state intervention in housing construction and supply, which was expressed in a high share of public housing construction. The phenomenon of spatial social differentiation was considered negative and unacceptable by the values of the socialist social system. Thus in residential neighborhoods a portion of the apartments were intended for sale, and a portion were allocated to people entitled to social housing or so called "solidarity apartments". These were intended for people with low incomes who would not otherwise be able to secure suitable housing for themselves. The result of this was a heterogeneous socioeconomic composition of the population in neighborhoods of apartment blocks. The socioeconomic position of owners of apartments was usually higher than that of those entitled to social housing. The privatization of socially owned housing and the introduction of a market economy at the beginning of the 1990s had an influence on the creation of a real estate market and associated greater spatial mobility of the population. Households with higher incomes frequently moved out of apartment block neighborhoods, in particular to single-family dwellings at the outskirts of the city or into new and higher quality apartments in Ljubljana, which led to a strong concentration of households with below average income in apartment blocks. Figure 40 represents the spatial distribution of average income by former local communities, expressed in income tax base per capita.

Figure 40: Local average income tax base per capita expressed as deviation (in %) from the average income tax base per capita in Urban Municipality of Ljubljana, 1999⁴⁹.



Sources: Tax Administration of the Republic of Slovenia (2001); Krevs (2002).

⁴⁹ Due to new legislation on statistical data publication more recent data are not available

Large areas with a homogeneous socioeconomic composition are the exception. Parts of the city with residents in a very low socioeconomic status, which often overlap with an above average share of the non-Slovene population and a specific family status, stand out. These are primarily some substandard neighborhoods of single-family houses on the city outskirts which came into being through illegal building and which have a high share of non-Slovenes⁵⁰, older working class neighborhoods⁵¹ and some larger neighborhoods of apartment blocks⁵². We could refer to them as socially deprived areas, with a concentration of population of the lowest socioeconomic status, a high rate of unemployment and an above average share of the non-Slovene population. The eastern and southern edges of the city also stand out for the relatively low socioeconomic status of the population.

Areas with good living conditions and a high housing standard and attractive location have an above average socioeconomic status of the population. In this category belong newer and larger neighborhoods of single-family houses with a uniform urban layout and a high quality living environment⁵³, the traditionally elite or "bourgeois" part of the city center between Slovenska Street and Tivoli Park, neighborhoods of villas⁵⁴ and certain newer multi-unit buildings with luxury apartments.⁵⁵ Accelerated new market housing construction in central parts of Ljubljana has caused a concentration of population with above average incomes in previously working class neighborhoods, which has all the characteristics of the phenomenon of gentrification.⁵⁶ Accelerated suburbanization has also created smaller areas with a high socioeconomic status of the population in suburban areas.⁵⁷

We conclude with the finding that Ljubljana is characterized by moderate socioeconomic segregation. An above average socioeconomic status of the population can be found in much of the city center and the western parts of the city, while a below average position is seen in the more industrial and working class eastern part of Ljubljana.

11.2. Ethnic segregation

The ethnic status of the population in Ljubljana is based on its national and religious composition, and indirectly based also on its occupational and educational composition. Thus for areas with a high share of non-Slovene population, there is a characteristic above-average share of lower educated and unskilled labor force employed mainly in manufacturing and services. This is a reflection of the social composition of the immigrant population from regions of the former Yugoslavia. Causes for immigration to Slovenia were primarily economic: economic underdevelopment, rural overpopulation, and a shortage of jobs in less developed regions of Yugoslavia and the demand for unskilled labor in Slovenia (particularly in manufacturing, construction, and services), a relatively favorable solution to the housing problem of immigrants and similar (Pak, 1993). About 10 % of the population living in Slovenia is non-Slovene, and in cities this share is usually

⁵⁰ Rakova jelša, Sibirija and parts of Tomačevo, Galjevica, Zalog, etc.

⁵¹ Vodmat, Moste and Zelena jama.

⁵² Štepanjsko naselje, Nove Jarše and Nove Fužine.

⁵³ Neighborhoods of row and atrium houses in Murgle, Galjevica, Dravljje, Bežigrad.

⁵⁴ Rožna dolina, Mirje, Poljane and others.

⁵⁵ The neighborhoods Mostec, Bežigrajski dvor, Nove Poljane, Kapitelj, Tabor and others.

⁵⁶ The localities of Poljane and Tabor.

⁵⁷ Particularly characteristic for the western and northern suburban areas.

higher. The non-Slovene population moved into urban areas which offered the greatest number of jobs for a labor force with a low level of education and skills. Due to the high share of people who did not specify their nationality in the 2002 Population Census the exact number of ethnic minorities in Ljubljana is impossible to determine. The share of the population who identified themselves as Slovene is thus 74 %. Of the remainder of the population, only half specified their nationality, such that the share of those with unspecified nationality is about 13 %.

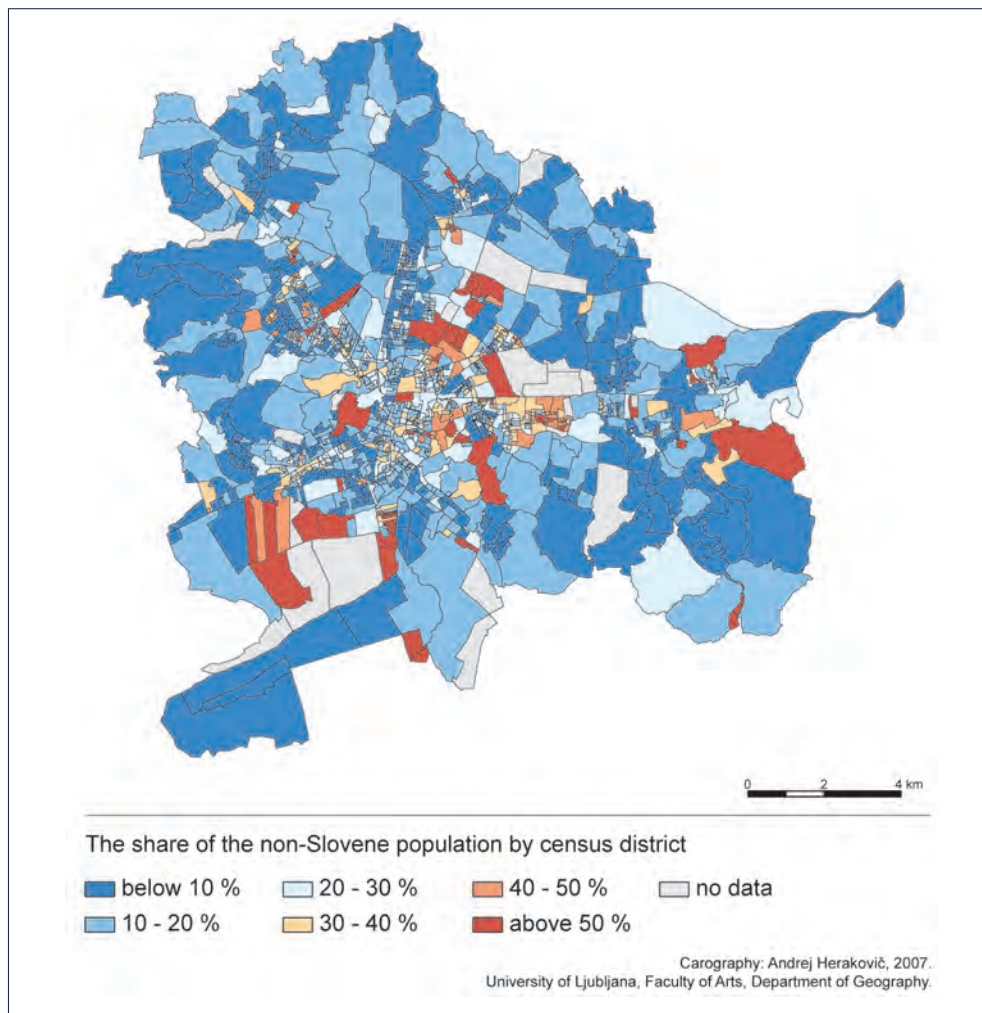
Most of the non-Slovene population moved to Ljubljana in the 1970s and 1980s, in particular between 1975 and 1982 (Repolusk, 2000). After 1991 immigration from regions of the former Yugoslavia contracted sharply; among the more recent immigrants there is a predominance of Albanians from Kosovo and Macedonia. Immigration from parts of the former Yugoslavia, especially from Bosnia and Herzegovina and Serbia, began to increase noticeably again after 2002, such that we can expect an increase in the number of immigrants in the subsequent years. The number of members of ethnic minorities is also growing through natural increase, but there is assimilation, particularly among the second and third generations of immigrants. The substance and meaning of ethnic belonging are the subject of constant examination and reinterpretation at the level of the individual and the community, in accordance with social circumstances. This is also clear from the census data and studies which find that the inhabitants of Ljubljana change their statements regarding nationality, religious faith and even native language (Komac, Medvešek, Roter, 2007, 99). According to the 2002 census data, 15 % of the population of Ljubljana, or about 40.000 people, immigrated there from parts of the former Yugoslavia. These are members of the first generation of immigrants. The number of members of the second and third generations, who are already partially or completely assimilated, cannot be determined from census data.

Ethnic segregation is defined as the uneven spatial distribution of an ethnic group relative to the rest of the urban population. Based on census data from 1991 and 2002 we found that ethnic segregation is also present in Ljubljana. The greatest problem for all immigrants is, in addition to finding employment, finding housing. For this reason new immigrants move in with relatives, friends, and acquaintances, i.e. with people from their home countries, who offer them initial assistance in settling in to the new environment. Due to low incomes they seek the cheapest accommodation and settle in areas with poor living and housing conditions. During the period of the most intensive immigration of the non-Slovene population into Ljubljana, settlements of barrack-type housing arose as well as neighborhoods of illegally and shoddily constructed one-family houses. A very typical form of accommodation are so-called "bachelor dormitories" belonging to various construction and industrial companies which use them to house their workers in minimal accommodation standards. As part of solving the housing problem of immigrants and improving barrack-type and other substandard settlements in Ljubljana, some public housing settlements were built, such as for instance the row houses in Tomačevno, Zgornji Kašelj and Črnuče. Some of the new immigrants have found housing in the older working class areas of the city with substandard accommodation. A large part of the non-Slovene population moved into the newly built apartment blocks of Štepanjsko naselje, Nove Fužine, Dravljice and Črnuče when socially owned apartments were being allocated or due to an improved financial situation. All this influenced the spatial distribution of the non-Slovene population in Ljubljana.

The highest shares of non-Slovene population are found in the following locations:

- substandard neighborhoods of one-family houses of Rakova jelša, Sibirija, Dolgi most, Tomačevo and Zgornji Kašelj,
- areas of bachelor dormitories in Bežigrad between Topniška and Vojkova streets and the apartment blocks of Litostroj in Šiška,
- older working class neighborhoods with substandard housing such as Zgornje Poljane, Stari Vodmat and Zelena jama,
- the apartment block neighborhoods from the seventies and the eighties of Nove Fužine, Spodnje Črnuče, Nove Jarše, Dravlje, Rapova jama, Savsko naselje and Zalog.

Figure 41: The share of the non-Slovene population by census district, Urban Municipality of Ljubljana, 1991.⁵⁸



Source: 1991 Population Census, Statistical Office of the Republic of Slovenia.

⁵⁸ Due to new legislation on statistical data publication more recent data is not available

The share of the non-Slovene population is highest in the substandard neighborhoods of one-family houses, where it exceeds 50 % everywhere, and is as high as 70 % in Rakova jelša. Of the apartment block neighborhoods, the highest share, 40 %, is in Nove Fužine and Črnuče, while it is somewhat lower in Savsko naselje, Nove Jarše, Rapova jama and Dravljje. In the older working class districts it reaches about 30 %. There are large differences in the shares of the non-Slovene population within particular neighborhoods, which is especially characteristic for the large apartment block neighborhoods of Nove Fužine and Dravljje. An above average share of the non-Slovene population (over 20 %) is characteristic for the majority of the other apartment block neighborhoods and for part of the old city center. The share of the non-Slovene population in most of the suburban areas, with the exception of the southern part, and in the majority of the neighborhoods of one-family houses such as Murgle, Podutik, Grba, Bežigrad, Kodeljevo and Vrhovci, is very low, less than 10 %.

The only areas with a majority share of non-Slovene population which could be called ethnic neighborhoods are the areas of substandard one-family dwellings Rakova jelša and Sibirija at the southern edge of Ljubljana. Typical of these substandard neighborhoods of single-family dwellings is illegal construction on plots of land that were not designated for individual housing construction. In the first phase of construction such settlements were without municipal, energy, telecommunications and transportation infrastructure. Gradually inhabitants in cooperation with the city administration addressed the problems of infrastructural hook-ups, and today these houses have access to at least the water supply network and electricity, and some are also hooked up to the municipal sewage system. They are characterized by a general poor quality of public spaces (for example unpaved roads) and untidy and unfinished residential dwellings and surrounding landscaping. Houses frequently have unfinished exteriors and unlandscaped gardens and yards, with heaps of building material waste and old cars. In the 1990s it was possible to observe a gradual cleanup of particular parts of these settlements, with the paving of roads, the fixing up of houses and the construction of individual new buildings. The socioeconomic position of the population in the parts of Ljubljana cited is extremely poor. More than 80 % of the population consists of unskilled and skilled workers employed in industry and services. Due to this occupational structure their incomes are only two thirds of the city average. Also poor is the educational structure of the population: quite a bit more than half have only primary school education or less.

11.3. Alternative approaches to social geographical research of Ljubljana

Several studies extend our social geographical knowledge about Ljubljana by shedding light on different inter-relations between the social-economic characteristics and structures of the population and its living environment. Geographical studies of level-of-living, or quality-of-life in term's wide sense, are among such studies (Krevs, 1998, 1999, 2000, 2002b). Level-of-living is a pragmatic measure of circumstances or conditions of living of the people at a certain area and in a certain period of time. The following "circumstances of living" have been taken into consideration in the study of Ljubljana (Krevs, 2002b): incomes and their distribution, residential conditions, attained level of education, ethnic heterogeneity, supply and accessibility of services, accessibility of basic medical services,

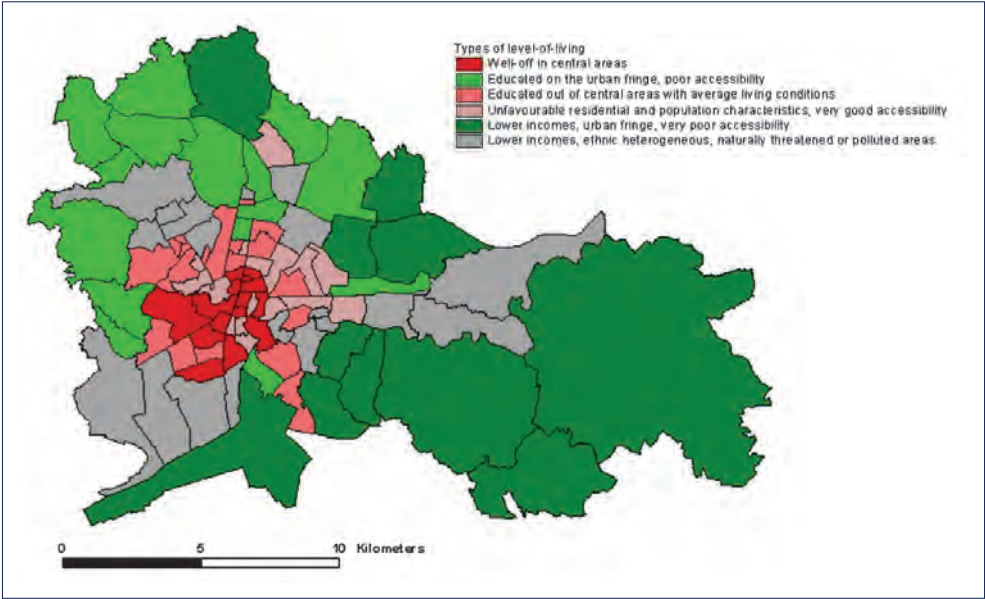
accessibility of recreative and leisure activities, traffic and transportation conditions, natural threats to residential areas and pollution of residential areas. These partial indicators of the level-of-living have been transformed into a single complex indicator. Two methods have been used, resulting in two different complex representations of the level-of-living. The “aggregated index of level-of-living” has been calculated using Bord’s average rank method. The highest values of the index show the biggest concentrations of predominantly favourable living conditions, which tend to be agglomerated around the city centre and in Murgle. The lowest values of the index on the other hand point out the local communities with a concentration of unfavourable living conditions: Rakova jelša, Zeleni log, Tomačevo, Črna vas and Besnica. In general unfavourable living conditions tend to concentrate in eastern and south-western part of the municipality. Another approach to complex representation of the level-of-living has been a classification (typification) of the studied areas into groups of areas with similar combinations of the values of “partial indicators” of level-of-living, in other words, with similar living conditions (table 32, figure 42).

Table 32: Share of population of Urban Municipality of Ljubljana in areas of different types of level-of-living.

Type	Short description of the type	% of population
1	Well-off in central areas	14,4
2	Educated on the urban fringe, poor accessibility	12,3
3	Educated out of central areas with average living conditions	21,2
4	Unfavourable residential and population characteristics, very good accessibility	21,5
5	Lower incomes, urban fringe, very poor accessibility	7,2
6	Lower incomes, ethnic heterogeneous, naturally threatened or polluted areas	23,4

Source: Krevs, 2002b.

Figure 42: Types of level-of-living in Urban Municipality of Ljubljana.



Source: Krevs, 2002b.

Among the aims of geographic research of level-of-living is to point out the occurrences of spatial and social inequality. The differences between the local communities in urban Municipality of Ljubljana prove that both aspects of inequality are quite clearly expressed. The existence of extreme inequalities is socially undesirable, among several reasons also because of its potential contribution to social tensions, especially when considerable differences occur between neighbouring local communities. An example of such spatial contact between local communities with extremely different level-of-living in Urban Municipality of Ljubljana occurs between Murgle, Rakova jelša and Zeleni log.

A study of short-term spatial processes of income differentiation among the local communities in Urban Municipality of Ljubljana (Krevs, 2002a) has shown increasing spatial concentration of the population with low incomes and in the same time a growing area of the population with higher incomes. Although the spatial differences in level-of-living and the intensity of the processes of their change found in Urban Municipality of Ljubljana may be moderate when compared to situations in majority of the capitals in Europe, a permanent attention should be paid to prevent extreme intensification of the spatial and socio-economic differentiation in the municipality.

A subjective reflection of the social segregation and its complex interrelations with other "circumstances of living" in neighborhoods in Ljubljana has been studied in a series of studies of perceptual spatial differentiation within Urban Municipality of Ljubljana (Krevs, 2004; Krevs, 2008; Kodre et al., 2000; Atelšek et al., 2001; Kramar et al. 2007; Žigon et al., 2010). Perception of neighbourhoods is understood as emotional, positive or negative, attachments to neighbourhoods as places, and Tuan's understanding of terms *topophilia* and *topophobia* (Tuan, 1974; 1977). An important conceptual spring of such a research is the linking of perception of the "real world" to (potential) spatial behaviour and eventually changing the physical and social environments. A broader aim is to follow changes of perceptual spatial differentiation of Ljubljana in parallel with, and in relation to several contemporary spatial processes going on in the area, like gentrification, changes in public safety, real estate prices, spatial changes in urban functions and social-economic segregation. »Neighbourhoods« have been defined on the basis of combination of two subdivisions of the municipality, city districts (*mestne četrti*) and former local communities (*krajevne skupnosti*). Neighbourhoods are characterized by at least some local identity and relative social-economical homogeneity. Sampling of the 1620 respondents⁵⁹ has been carried out. From every of the 27 neighbourhoods a quota sample of adult respondents has been taken, roughly corresponding to local gender and type of housing structures.

Answering to such questionnaires, respondents mix both, attitudes originating from their own experiences, as »insiders« or »outsiders«, of individual neighbourhoods, and »constructed attitudes«, based mostly on external information. The first type of attitude is based mainly on distinctive emotional or rational bonds to individual neighbourhoods or locations within them. The second type of attitudes is basically »constructed for the purpose«, using any information available in respondents memory and to his mind at the moment of answering to the questionnaire. The questions were designed in the following way:

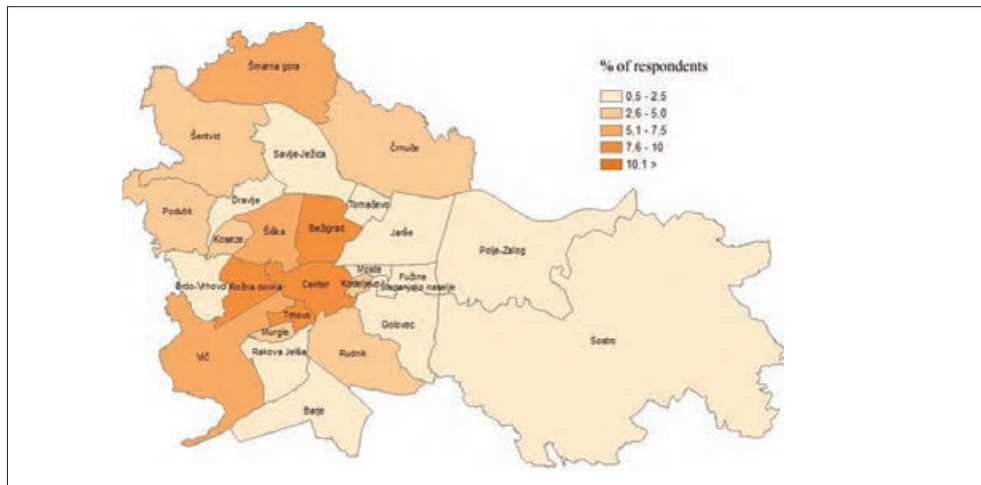
- respondents had to pick three of the neighbourhoods from Municipality of Ljubljana that – by their opinion – suit best to a given characteristic; majority of respondents are supposed to be able to report their perception of several neighbourhoods; picking three of them instead of only one should just make the task easier, as the ranking they use is not so restrictive;

⁵⁹ Number of respondents in the study in 2009; the local samples of residents have been enlarged from 30 per neighbourhood in the study in 2002 to 60 per neighbourhood in 2009.

- only three – by our opinion very unambiguous - aspects of perceptions of neighbourhoods have been studied, demanding respondents to choose the neighbourhoods that are the most attractive for living, the least attractive for living, and the most unsafe; in terms of tophophilia and tophophobia, the answers to the first question show “love for a neighbourhood”, answers to the second question “hate of a neighbourhood”, and answers to the third question “fear of a neighbourhood”;
- respondents then presented the arguments supporting their choices of neighbourhoods; this qualitative information is the basis for our interpretation of the perceptions of the neighbourhoods, including the context of these perceptions, and their potential impacts on the spatial processes in the future.

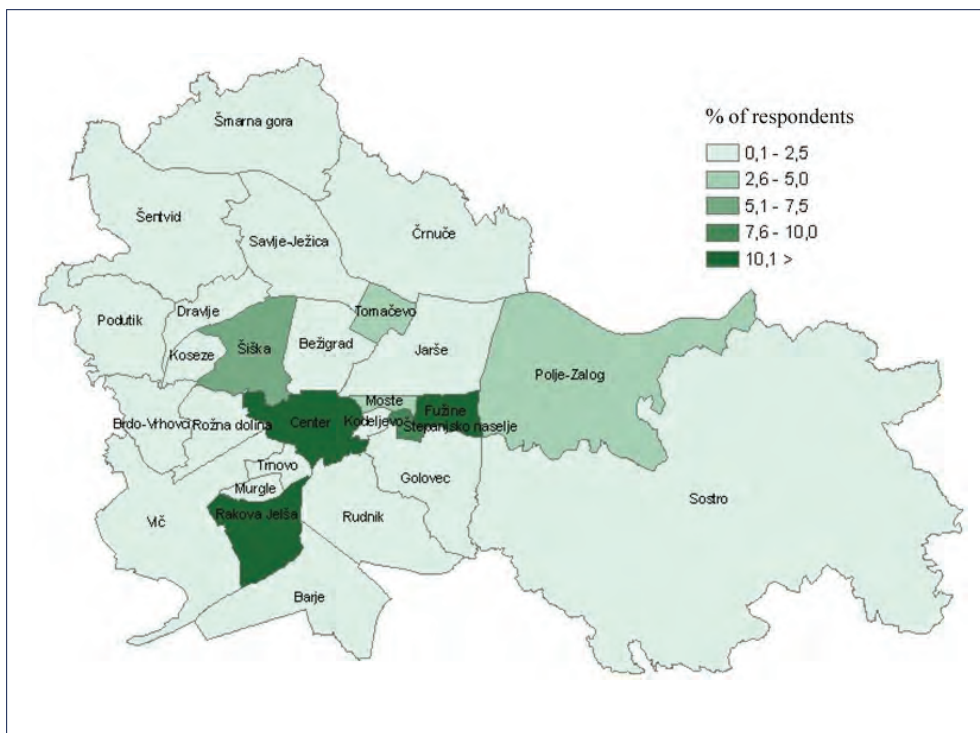
Territorial aggregation of collected responses allows us to study “intensity” of perception, defined by proportion of respondents choosing individual neighbourhoods from a given aspect of perception (Figures 43 and 44). Positive attitudes to neighbourhoods are considerably more evenly spatially distributed, characterized by smaller spatial variability of the intensity of perception, than the negative ones. “Rožna dolina” and “Center”, the most often selected as neighbourhoods attractive for living, were “chosen” by about 20 % of respondents, “Nove Fužine” as the most non-attractive neighbourhood for living by more than 40 % of respondents, and the same neighbourhood as the most unsafe by nearly 70 % of respondents in the study from 2009. At least a partial explanation of this finding could be a wider range of factors influencing positive perceptions, which are probably more often based on respondent’s own experience. On the other hand the negative perceptions may be based on a single (or a small number of) criterion, possibly »borrowed« from general public opinion and clichés. Selecting “the worst” neighbourhoods is practically always “pointing at others”, while all the neighbourhoods, even “the worst” by general opinion, are selected as “attractive for living” at least by some locals. The negative stereotypes about the characteristics of the neighbourhoods tend to be much stronger, spatially more concentrated to certain neighbourhoods than the positive ones. And from the perspective of distance to selected neighbourhoods from “home neighbourhood”, the positive attitudes tend to have more spatially autocorrelated distribution than the negative ones.

Figure 43: The perceived most attractive neighbourhoods for living in Urban Municipality of Ljubljana.



Source: Žigon et al., 2010.

Figure 44: The perceived most unsafe neighbourhoods in Urban Municipality of Ljubljana.



Source: Žigon et al., 2010.

Pearson correlation coefficients are taken as a rough estimate of correlation between “perceptual information” and selected socio-economic characteristics of the neighbourhoods. These estimates help us to generally interpret relations between perceptions or attitudes to neighbourhoods (“perceived neighbourhoods”), and some aspects of “objective circumstances” in the neighbourhoods (“objective neighbourhoods”). Correlation coefficients in general reflect low correlations between the (“subjective”) perceptions and selected “objective” socio-economic characteristics of the neighbourhoods. This in a way supports the behavioural geographical claims of a usually strong distinction between the “objective environment” and the “behavioural environment”, constructed from non-perfect and subjectively filtered information. Moderate correlations (absolute value of $r > 0.5$) are found between the:

- proportion of respondents choosing a neighbourhood as attractive for living, and the size of housing compared to number of residents, and taxable income per capita;
- proportion of respondents choosing a neighbourhood as non-attractive for living, and the proportion of “non-Slovenian” population, and size of housing compared to number of residents;
- proportion of respondents choosing a neighbourhood as unsafe, and the proportion of “non-Slovenian” population.

The limited selection of variables presenting the characteristics of neighbourhoods in the analysis does not allow us to draw general conclusions about the criteria of neighbourhood perception. But we notice a shift from more “materialistic” values behind the positive perceptions towards more “nationalistic” ones behind the perceptions of non-attractive and unsafe neighbourhoods.

A more complex presentation of perceptual spatial differentiation in our study is a typology of neighbourhoods based on all three aspects of neighbourhood perceptions (table 33, figure 45; Krevs, 2004). Only a small part of the studied neighbourhoods are perceived intensively from any of the studied aspects. “Poorly perceived” neighbourhoods (white on the map) are not necessarily “placeless” (term as used by e.g. Entrikin, 1991, Relph, 2002) – missing visual and perceptual identity and particularity. They may simply be perceived as “non-relevant” from the studied aspects by majority of respondents. Three “kinds of types” (of combinations of intensive perceptions) of neighbourhoods are found. Two “kinds” include “pure” types, based on exclusively positive (“love”) or negative perceptions (“hate” and “fear”, “hate” and “some fear”). The only a bit surprising among those is the intensive positive perception of neighbourhood “Šmarna gora”, suburban community with average social-economic structure at the northern outskirts of the municipality, experiencing second highest growth of population in the last decade among the studied neighbourhoods. Other neighbourhoods of these kinds (positively or negatively perceived) are much closer to the city centre. The third kind of perceptual types are based on combinations of positive and negative perceptions. These mixtures clearly demonstrate complexity of human spatial perception, and are by no means surprising. The most extreme case, neighbourhood “Center”, is perceived intensively from all the three studied aspects: “loved”, “hated” and “feared”. The first two are usually not combinable at the level of individual respondents, mostly due to substantial differences in residential preferences, and can only be found on an aggregated level. The other two combinations (“love” and “fear”, or “hate” and “fear”) are quite expected, could be explained “objectively”, and are found also in other neighbourhoods of these “mixed” types (“Bežigrad”, “Tomačevo”, “Polje-Zalog”).

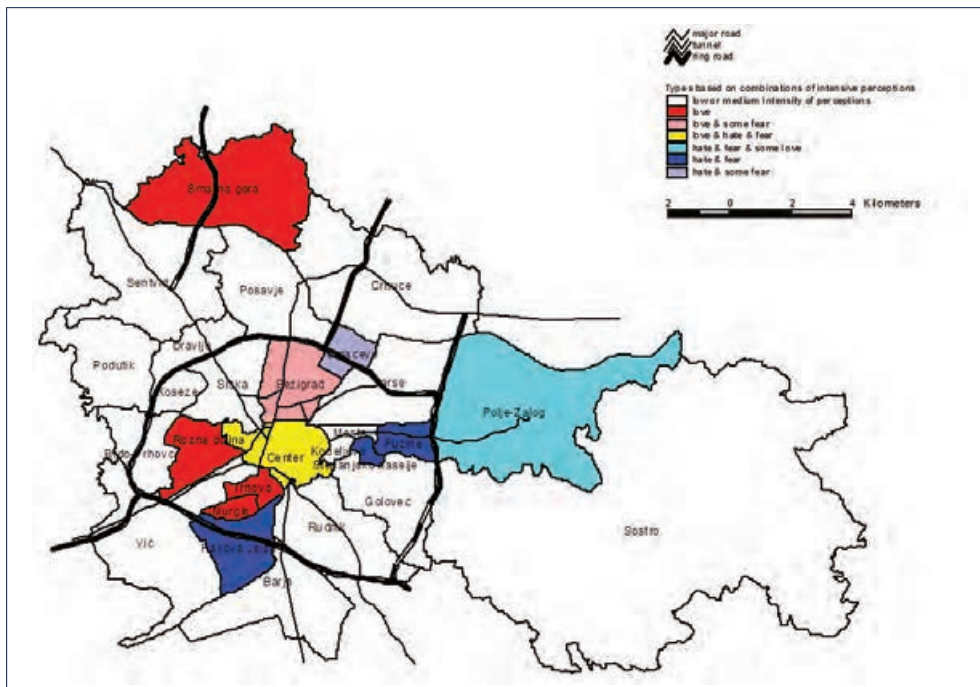
Table 33: Characteristics of complex perceptual types of neighbourhoods based on combinations of intensive perceptions – in terms of topophilia and topophobia.

Perceptual type of neighbourhood	Some characteristics of neighbourhoods of certain type
“love”	different types of »good« social areas close to the centre, and one suburban neighbourhood
“love & some fear”	socially mixed, neighbouring to the city centre
“love & hate & fear”	city centre, mixed but in average “good” social-economic characteristics
“hate & fear & some love”	socially mixed suburban area
“hate & fear”	biggest area of illegal housing and concentration of »non-Slovenians«, and two big multi-family housing neighbourhoods
“hate & some fear”	former rural, now suburban area with relatively poor social structure

Note: all other neighbourhoods are perceived by medium or low intensity from all three studied aspects.

Source: Krevs, 2004.

Figure 45: *Topophilia and topophobia of the neighbourhoods in Urban Municipality of Ljubljana.*



Source: Krevs, 2004.

The continuing longitudinal study of spatial changes of perceptual differentiation of the Municipality of Ljubljana will allow us to follow temporal variability of perceptual as well as social differentiations, together with their sensitivity to certain processes in "objective environment" and in changes of value systems, ways of living, spatial behaviour. Hopefully, the media and the politicians will use the lesson learned from the relations found between the negative perceptions of the neighbourhoods and their origin in stereotypes. They could considerably contribute to gradual replacement of the existing pejorative stereotypes by improvements in the "images of the neighbourhoods", positive local identities, local social cooperation, which could eventually influence even rise of real estate prices.

11.4. Conclusions

Social spatial segregation exists in Ljubljana and is comparable to that of other cities in Central and Western Europe in its main features. The social geographic structure of Ljubljana has undergone considerable changes, which can be seen in some characteristic processes of social transformation. There is a noticeable increase in socioeconomic spatial differentiation, as seen in the formation of elite parts of the city whose residents have a very good socioeconomic status, mainly newer luxury neighborhoods and parts of the city center. At the other extreme are certain parts of the city, particularly older apart-

ment block neighborhoods, where signs of social degradation can be observed. In some socially degraded areas the socioeconomic position of the population is improving; this is characteristic mainly of parts of the old city center and older suburbs and of particular parts of the city's outskirts.

In the future development of the city we can expect a continuation of the trends described in the direction of increased socioeconomic differentiation. The population with higher income and a better socioeconomic status will move into areas with good living conditions and access, especially in suburban areas. At the same time we can expect a continued concentration of people with a high incomes in particular areas of the city center that are attractive places to live, particularly in part of the old city center and certain villa districts. Along with this the social and physical degradation of certain parts of the city, particularly older and larger apartment block neighborhoods, will continue and deepen. Given the general aging of the population of Ljubljana there will also be an increased concentration of elderly people in certain parts of the city.

12. Spatial structures and functional organization of Belgrade

Ivan Ratkaj, Mirko Grčić

The study of the structural and functional organisation of Belgrade, in this chapter, has been limited on the territory of the General Plan (GP). The decision was made by taking into consideration the qualitative information basis of the space defined in such a way – the relative accessibility of the documentary, statistical and cartographic materials. The detailed urban study means gathering information and their studying on the level of small territorial units - statistical circles (total 434). The basis of the chapter represents the approach which is similar to the factor ecology. The usage of the quantitative methods in the studies of the urban structures we have considered justified, among others, because the influence of the social theory on the so-called post modern urban literature was too fast in emphasizing the contemporary socio-cultural changes, disregarding the stability that could be present in the spatial structure of the city (Danielson & Wolpert, 1994). Even though the urban theory tends to be removed from the spatial determinism, the numerous researches point to the steadiness of the spatial forms, originated in the link with the previous processes of urbanisation (Wyly, 1999). Additionally, just when the dynamic development of the information technology and GIS enable the promotion of the mathematical-statistical and cartographic methods, the rejection of the positive results acquired using factor ecology, seems absurd. The indexes which exceed the sphere of the traditional factor ecology have been used in the chapter. The traffic-functional organisation of the city, expressed through the indexes of the accessibility of place of work and place of residence, has been taken as a relevant input parameter, which is partly or completely disregarded in the researches of the similar character. Moreover, the contemporary local indexes of isolation have been used as relevant factors (Ratkaj, 2007a). The method of the factor analysis, in most of the urban studies, is exclusively applied with the aim of determining the factors that act within the frames of the social structures. This deficiency has been overcome by the systematic inclusion of the physical structure of the city. Moreover, the use of different methods of the multi-variation analysis could also advance the traditional comprehension of the urban ecology.

12.1. Factor analysis of Belgrade

Most variables, necessary for the application of the factor analysis in the area of the General Plan of Belgrade, on the level of the statistical circles, were derived by a special analysis of the results of 2002 census (Statistical Office of the Republic of Serbia, 2002). In the factor ecology the census data have usually been used (e.g.: Murdie, 1969; Knox, 1987; Le Bourdais & Beaudry, 1988; Wyly, 1999). The census results contain important information on the population and its structures, households, as well as different characteristics of the resided structures. These data are deprived of the subjective interpretation, so

that as such they can be considered as reliable, and what is also important, spatially and temporally comparable. The part of variables, referring to the connections between the transportation and city organisation, as well as the ethnical segregation, has been obtained by the analysis in the previous papers of the author (See: Ratkaj, 2007b; Ratkaj, 2008). Finally, as the source of information on the land purpose, the map on The Existing Land Use (2001) of Urban Planning Institute of Belgrade (UPIB, 2002) is used, which is integrated with the map of the statistical circles.

In the factor analysis of the territory of the GP of Belgrade, we are going to use 60 variables - 28 in the part which is related to the social space, while the rest of 32 in the analysis of the physical space of the city. The variables are chosen from the initial set of over 300 variables. They are partly based on the tradition of the factor ecology, and partly on the characteristics of the examined area, as well as the census material.

12.2. Indexes of social areas of Belgrade

The variables, which are used in the analysis of the social areas, can be classified approximately into four categories: demographic characteristics, characteristics of households and families, social structure of population and standard of residence. Because of the need for the tabular review of the factor analysis results, the abbreviated term of each variable is given near the description.

Demographic characteristics are measured using the following variables: 1) index of population ageing (ageing index); 2) share of population aged between 15 and 64 in total population (mature population); 3) proportion of the number of children aged to 4 and female population aged between 15 and 44 (fertility); 4) spatial index of isolation of Romany population (Romany isolation); 5) share of the inhabitants who did not change the place of residence from their birth in total population (autochthonous population); 6) share of population migrated from 1991 in total population (migrants of 1991).

The first two variables are reflected directly or indirectly in the shares of the base age categories of the population. The third variable is taken as the conditional index of the fertility. The ethnic structure of the population is expressed through the local index of the Romany isolation. The analysis of the ethnic housing segregation in Belgrade preceded the selection of this variable, based on the innovative concept of the neighbourhood, i.e. the approaches of Wong, Reardon and O'Sullivan (Wong, 2003; Reardon & O'Sullivan, 2004) (see: Ratkaj, 2007b). The last two variables enable the distinguishing of the migration passive and recently attractive city zones.

Variables measuring the characteristics of households and families are: 1) share of single households in total number of households (single households); 2) share of aged households in total number of households (aged households); 3) average size of households (size of households); 4) share of married couples with children aged to 25 in total number of families (pairs with children); 5) share of incomplete families with children aged to 25 in total number of families with children (incomplete families with children); 6) share of married population older than 17 in total population older than 17 (married); 7) share of divorced population older than 17 in total population older than 17 years (divorced); 8) share of households with agricultural farm in total number of households (households with farms).

The first three variables relate to the size and age of the households, while the following four to the characteristics of the families and marital structure of the population (where population older than 17 has been taken into consideration, due to tendency of late marriages in urban areas). The share of incomplete families and divorced can be treated as the consequence of urbanisation and the acceptance of the contemporary model of behaviour, but also as the possible source of the social problems. The last variable, although it is the characteristic of the household, points indirectly to the economic structure of the population.

Social structure of population is represented by the following variables: 1) share of population older than 14 who reached maximum primary education, and who discontinued further education, in total population older than 14 (primary education); 2) share of population older than 24 reaching higher education in total population older than 24 (higher education); 3) share of employed in the primary sector of activities in total employed population (I sector-employed); 4) share of employed in the secondary sector of activities in total employed population (II sector-employed); 5) share of employed in the tertiary sector of activities in total employed population (III sector-employed); 6) share of employed in the quaternary sector of activities in total employed population (IV sector-employed); 7) share of employed in total active population (unemployed); 8) share of retired persons in total population (retired persons); 9) share of children, pupils and students as dependent persons, in total population (children, pupils and students); 10) share of housewives in female population older than 14 (housewives).

The first two variables are partly changed in relation to the standard statistical indexes. The share of conditionally insufficiently educated population (completed maximum primary education), can be defined more precisely if the population that continued further education is excluded from it. The share of highly educated population is calculated for older than 24. The next four variables represent the shares of employed population by the sectors of activities. The share of unemployed can be the significant index of the social problems. Children, pupils, students and housewives can be distinguished from the contingent of dependent population and economically active population. The share of housewives in female population older than 14, is also reflected in degree of women's emancipation.

Standard of residence is measured on the basis of the following variables: 1) average number of persons per apartment house (density of residence); 2) share of persons who live in apartments for permanent residence of the first category in total number of residents (residence – I category); 3) share of persons who resided rooms in need, in total number of residents (residence - need); 4) average area of resided apartment per person (size of apartment per person).

In regard of the indexes of the standard of residence and according to the recommendations of the Statistical Office of the Republic of Serbia, all permanent residents are included in the number of persons who live in apartment, but also the persons who are in the place of the census temporarily due work or education, since they also burden the housing fund. Although the population density is included into the standard of residence indexes in many studies, we are of the opinion that the index is more appropriate to the analysis of the physical space. Instead of it, the average number of residents per apartment house has been included here, as the density which inhabitants notice and

feel more. The following variables reflect the standard of residence. For the needs of the analysis, all apartments are selected arbitrarily into three categories: apartments of the first category are those with bathroom, toilet, kitchen, electricity, outside walls of solid material, water supply and sewerage system and they have either central heating or gas line system; apartments of the second category have all characteristics of the first one, with a difference that they have neither central heating nor gas line system; all other apartments belong to the third category.

12.3. Indexes of physical space of Belgrade

The variables in the factor analysis of the physical space are classified into four categories: land purpose, location and spatial organisation, characteristics of function of labour and characteristics of function of residence.

Land purpose has been measured by the 1) share of residential tissue and land aimed for residence in total land (residential tissue); 2) share of land under cultivation and structures, experimental agricultural properties and farms in total land (agricultural areas); 3) share of economic zones and land aimed for conducting activities in total land (economic zones); 4) share of commercial zones and urban centres in total land (commercial zones); 5) share of public facilities, complexes and land aimed for public services in total land (public services).

Every analysis of the physical space of the city should contain data on the land purpose. Although we consider them unavoidable, the reliability of these variables should be treated with reserve. For example, land purpose does not include information about floors, while the public and commercial capacities, as well as residence, often physically (spatially) coincide.

Location and spatial organisation have been measured by the following variables: 1) population density (population density); 2) density of work places (density of work places); 3) concentration of population (concentration of population); 4) concentration of work places (concentration of work places); 5) proportion of number of work places and population number (work places/population); 6) temporal distance from city centre (distance from centre); 7) temporal accessibility of work places (accessibility of work places); 8) temporal accessibility of places of residence (accessibility of places of residence).

The first five variables relate to the spatial distribution of places of residence and work places. We also consider the concentrations of the basic urban functions as important indexes of labour organisation, and thus their mutual relationship. The data on the centrality of the statistical circles, as well as the accessibility of work places and places of residence are obtained on the basis of the detailed traffic-functional analysis (Ratkaj, 2008). The dispersal of the residential zones, on one side, and relative concentration of the urban functions, on the other side, is the significant problem of the transportation system of Belgrade. The evolution of the accessibility enables the balanced approach to the transportation analysis and calls attention to the alternative strategies with an aim of solving the problems.

Variables representing the characteristics of functions of labour are: 1) share of work places in the primary sector of activities in total number of work places (I sector - work places); 2) share of work places in the secondary sector of activities in total number of work places (II sector - work places); 3) share of work places in the tertiary sector of activities in total number of work places (III sector - work places); 4) share of work places in the quaternary sector of activities in total number of work places (IV sector - work places); 5) concentration of work places in the primary sector of activities (I sector - concentration); 6) concentration of work places in the secondary sector of activities (II - concentration); 7) concentration of work places in the tertiary sector of activities (III - concentration); 8) concentration of work places in the quaternary sector of activities (IV - concentration).

This category of variables contains data on the spatial structure and concentration of work places grouped into four sectors of activities.

Characteristics of function of residence is measured by the: 1) share of apartments for permanent residence built to 1918 in total area of apartments for permanent residence (apartments to 1918); 2) average age of apartments for permanent residence (age of apartments); 3) average size of an apartment house, i.e. total area of apartments for permanent residence in the building (size of building); 4) share of individual houses in total number of apartments for permanent residence (individual house); 5) average area of an apartment for permanent residence (size of an apartment); 6) share of apartments for permanent residence of the first category in total area of apartments and other resided rooms (apartments - I. category); 7) share of apartments for permanent residence of the second category in total area of apartments and other resided rooms (apartments - II category); 8) share of apartments for permanent residence of the third category in total area of apartments and other resided rooms (apartments - III category); 9) share of apartments in total area of apartments and other resided rooms (apartments); 10) share of resided business rooms in total area of apartments and other resided rooms (resided business rooms); 11) share of rooms resided in need in total area of apartments and other resided rooms (resided in need).

The first five variables relate to, conditionally said, the area of an apartment in the narrower sense, i.e. apartments for permanent residence: their age, size and building density. The following six variables point to the qualitative structure of the total space which is used (or it can be used) for residence: the shares of apartments for permanent residence of the certain category, the apartments for all purposes, resided business rooms and rooms resided in need.

12.4. Factor ecology of social space of Belgrade

One of the first steps in the factor analysis is the calculation of the matrix of coefficients of correlation among the chosen variables, the values of which have previously been standardised. In this chapter, the matrix has satisfied the criteria which contribute to the reliability of the factor analysis results (the matrix is not singular, the KMO index of the sample adequacy is calculated and the Bartlett's test is carried out). The characteristic roots and "screen" diagram have been used in selecting the number of factors. The selection of five factors has been considered as acceptable, taking also into consideration the part of the overall variance that would be explained by that model - 72.06 % (Table 34).

Table 34: Significance of selected factors in non-rotated and rotated matrix of factor load (for the social space of the city).

Factor (comp.)	Non-rotated matrix			Rotated matrix		
	Character. root	Variance (%)	Cumulative Variance (%)	Character. root	Variance (%)	Cumulative variance (%)
1	11,4167	40,77	40,77	7,7291	27,60	27,60
2	3,2111	11,47	52,24	4,4812	16,00	43,61
3	2,1753	7,77	60,01	2,8391	10,14	53,75
4	1,7791	6,35	66,37	2,6715	9,54	63,29
5	1,5936	5,69	72,06	2,4550	8,77	72,06

The rotated matrix of the factor load (Table 35) shows the strength of the correlation among all variables and rotated factors. In this chapter, the factor loads, the absolute values of which are higher than 0.400 are considered to be relevant. The highest factor load for each variable is highlighted in bold. In spite of the Varimax rotation, the secondary loads are present with the absolute values higher than 0.400. The last column in the Table 35 represents the communality which points to the part of the variable variance which is explained by the given structure of factors. An extremely low value of the communality appears only in the share of employed in the tertiary sector. In spite of that, this variable is kept in the analysis as the relevant index of the social space of the city. The terms of the selected factors are partly adapted to the traditional terms in the factor ecology, while they also partly reflect the characteristics of the concrete urban area.

Table 35: Rotated matrix of factor loads and communality (for the social space of the city).

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Commun.
Index of ageing	-0,278	0,822	0,165	0,053	-0,178	0,814
Mature population	0,056	-0,780	0,061	0,128	-0,269	0,704
Fertility	0,279	-0,214	-0,111	-0,074	0,585	0,484
Romany isolation	0,089	-0,052	-0,052	0,041	0,766	0,602
Autochthonous population	-0,016	0,142	-0,191	-0,882	-0,063	0,839
Migrants 1991.	0,231	-0,203	-0,075	0,725	0,236	0,681
Single households	-0,827	0,296	0,035	-0,212	-0,053	0,821
Aged households	-0,542	0,721	0,069	-0,142	-0,183	0,872
Size of households	0,897	-0,253	-0,161	0,011	0,161	0,920
Pairs with children	0,413	-0,703	-0,217	0,210	0,195	0,793
Incomplete families with children	-0,777	0,235	0,035	-0,331	-0,023	0,770
Married	0,842	-0,218	-0,053	0,195	0,069	0,802
Divorced	-0,744	0,199	-0,152	-0,129	-0,019	0,633
Households with farms	0,770	0,235	-0,281	-0,156	-0,117	0,765
Primary education	0,717	-0,118	-0,508	0,095	0,298	0,883
Higher education	-0,658	0,424	0,459	-0,186	-0,038	0,860
I sector employed	0,708	0,217	-0,145	-0,407	-0,006	0,735
II sector –employed	0,324	-0,312	-0,402	0,540	-0,152	0,678
III sector –employed	-0,019	-0,365	-0,032	0,135	0,072	0,158
IV sector employed	-0,739	0,240	0,436	-0,156	0,003	0,818
Unemployed	0,229	-0,017	-0,486	0,574	-0,174	0,649
Retired persons	-0,619	0,576	0,323	-0,079	-0,247	0,887
Children, pupils and students	0,020	-0,709	0,055	-0,072	0,512	0,773
Housewives	0,667	-0,012	-0,346	0,287	0,412	0,816
Density of residence	-0,014	0,089	0,767	0,086	-0,080	0,611
Residence - 1. category	-0,303	0,152	0,776	-0,056	-0,148	0,743
Residence - need	-0,084	-0,118	-0,035	0,125	0,738	0,582
Size of apartment per person	-0,135	0,562	0,259	-0,224	-0,171	0,481

Factor 1 - Traditional social status: This structurally very complex factor is characterised by large households, with the insignificant share of single households. Moreover, it is directly proportional to the share of married, and inversely proportional to the share of divorced adult persons. In accordance with, conditionally said, a traditional way of life, the share of incomplete families with children is also low, whereas the shares of households with agricultural farm and employed in the primary sector of activities are high. Consequently, the factor correlates negatively with the share of employed in the quaternary sector. In the educational structure, the high positive correlation is expressive with the share of insufficiently educated population, while it is negative with the share of highly educated population. Young population and low share of retired persons characterise the traditional status. This factor also shows the high correlation with the share of housewives, which speaks in favour of the insufficient emancipation of women. Additionally, there are also two secondary high factor loads: the share of aged households has negative load, whereas the share of married couples with children to 25 years old has positive load.

Factor 2 - Phase in life cycle (family status): This factor is characterised by the high positive correlation with the index of ageing and the share of aged households, but the negative correlation with the share of mature population and children, pupils and students (as dependent population categories). The share of married couples with children shows high negative load, while the positive one is at the size of an apartment per resided person. Moreover, there are two secondary positive loads: the share of highly educated population and retired persons.

Factor 3 - Standard of residence: The high standard of residence is characterised by the high average number of persons per apartment house, as well as high share of persons resided in the apartments of the first category. Even though the factor 3 has been determined to the greatest extent by these two variables, the influence of five variables with the secondary factor loads, which determine the social structure of the population, is not minor either. The negative correlation is expressed in the share of population with completed maximum primary education, while the positive one is in the share of highly educated. Moreover, the variables referring to the economic structure of the active population influence the factor 3: the shares of employed in the secondary sector of activities and unemployed have the negative loads, whereas the share of employed in the quaternary sector has the positive load.

Factor 4- Migration mobility: The high degree of migration mobility characterises the share of population migrated after 1990 and small share of the autochthonous population. The high positive factor loads also have the shares of unemployed and employed in the secondary sector. The share of employed in the primary sector has the secondary negative load.

Factor 5 - Housing segregation: The segregation is only noted at Romany population, while other communities are well integrated into the major Serbian population. The very high positive correlation of housing segregation has the share of persons who live in structures resided in need, as well as the spatial isolation of the Romany population. This factor also shows the high positive correlation with the variable that has been chosen as the indicator of fertility in this study. Two variables, referring to the dependent population category, show the secondary positive factor loads.

12.5. Factor ecology of physical space of Belgrade

The matrix of coefficients of correlation among the standardised values of 32 variables has pointed to the reliability of the results that can be obtained by the factor analysis. Moreover, it was decided to select six factors in the analysis of the physical space of the city, which explained 70.51 % of the variance of variables. That could be considered as a very good result (Plane & Regerson 1994).

Table 36: Significance of selected factors in non-rotated and rotated matrices of factor loads (for the physical space of the city).

Factor (comp.)	Non-rotated matrix			Rotated matrix		
	Character. root	Variance (%)	Cumulative Variance (%)	Character. root	Variance (%)	Cumulative variance (%)
1	10,0465	31,40	31,40	9,1233	28,51	28,51
2	3,6468	11,40	42,79	3,2816	10,26	38,77
3	2,8807	9,00	51,79	2,7199	8,50	47,26
4	2,3161	7,24	59,03	2,5983	8,12	55,38
5	2,0811	6,50	65,54	2,5892	8,09	63,48
6	1,5929	4,98	70,51	2,2519	7,04	70,51

The rotated matrix of the factor loads is given in the Table 37. The value of the communalities points that some of the chosen variables are not explained sufficiently by the factor structure, concretely: work places/population and I sector - concentration. In the urban analysis, one should not avoid the index which determines the dominant function of the given spatial unit. Moreover, other indexes of the concentration of employed by the sectors have high communalities.

Table 37: Rotated matrix of factor loads and communality (for the physical space of the city).

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Commun.
Housing tissue	0,714	-0,253	-0,329	0,033	-0,149	-0,101	0,716
Agricultural areas	-0,868	-0,098	-0,067	-0,042	-0,092	-0,055	0,781
Economic zones	0,023	0,245	0,097	-0,040	-0,104	0,648	0,503
Commercial zones	0,254	0,003	0,562	-0,161	-0,103	-0,002	0,417
Public services	0,279	0,302	0,173	-0,026	0,685	-0,167	0,696
Population density	0,898	-0,211	0,032	0,116	0,040	-0,023	0,868
Density of work places	0,881	0,014	0,256	-0,062	0,235	0,060	0,904
Concentration of population	0,148	-0,117	0,049	0,744	-0,063	0,140	0,614
Concentration of work places	0,236	0,140	0,711	0,187	0,467	0,275	0,910
Work places / residents	-0,006	0,326	0,061	-0,085	0,188	-0,059	0,156
Distance from centre	-0,853	-0,045	-0,205	0,132	-0,181	-0,006	0,822
Accessibility of work places	0,825	0,028	0,285	-0,229	0,192	-0,070	0,857
Accessibility of places of residence	0,895	0,035	0,232	-0,105	0,156	-0,043	0,893
I sector – work places	-0,617	-0,185	0,051	-0,200	0,075	-0,141	0,483
II sector – work places	0,002	-0,083	-0,190	0,006	-0,115	0,864	0,804
III sector – work places	0,140	0,081	0,264	0,156	-0,768	-0,258	0,778
IV sector – work places	0,478	0,129	-0,064	0,045	0,639	-0,373	0,798
I sector – concentration	-0,228	-0,155	0,257	-0,078	0,048	0,025	0,151
II sector – concentration	0,099	-0,078	0,256	0,147	0,221	0,810	0,807
III sector – concentration	0,205	0,075	0,833	0,185	-0,018	0,031	0,776
IV sector – concentration	0,219	0,255	0,484	0,107	0,688	-0,073	0,838

Table 37: Continued

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Commun.
Apartments to 1918.	0,296	-0,043	0,180	-0,555	0,013	-0,005	0,430
Age of apartments	-0,600	0,032	-0,186	0,641	-0,107	0,067	0,823
Size of apartment house	0,238	-0,083	0,364	0,554	0,030	-0,104	0,515
Individual house	-0,832	0,064	-0,229	-0,223	-0,056	0,018	0,801
Size of apartment	-0,555	-0,379	-0,026	-0,018	0,212	-0,116	0,511
Apartments – 1. category	0,558	-0,153	0,211	0,647	0,100	-0,051	0,811
Apartments – 2. category	0,693	-0,103	-0,037	-0,454	0,022	0,082	0,706
Apartments – 3. category	-0,877	-0,061	-0,160	-0,178	-0,097	-0,011	0,840
Apartments	0,011	-0,962	0,005	0,023	-0,070	-0,048	0,934
Business rooms	-0,009	0,895	-0,014	-0,025	0,169	0,030	0,831
Resided in need	-0,011	0,884	0,008	-0,016	-0,064	0,063	0,790

Factor 1 - Centrality, accessibility and building of space: In this factor, the share of land aimed to the housing function has positive load, while the share of agricultural land is characterised by an extremely high negative load. Nevertheless, the existence of floors has to be emphasized, i.e. the spatial coincidence of different urban capacities - there is a high share of partly apartment houses in the zone of high accessibility and building, wherein the function of labour is also performed on lower floors. The statistical circles with high results in this factor are characterised by high population densities and work places, i.e. the intensive land use. The height of the factor results is directly proportional to the levels of the transportation accessibility of places of work and places of residence, while the distance from the city centre has extremely high negative factor load. In the structure of work places, the negative factor load is shown by the share of work places in the primary sector. Moreover, there is a relevant secondary factor load of the share of work places in the quaternary sector. The factor 1 shows the negative correlation (of the secondary character) with age of apartments – highly centralised and accessible territorial units have high share of old housing units. The negative loads of the shares of individual houses and average sizes of apartments give more detailed picture on the characteristics of the housing function. This factor also shows the positive correlation with the share of apartments of the second category, but the negative one with the share of apartments of the third category of quality. The secondary positive factor load also appears in the share of apartments of the first category. Such structure of the housing fund speaks on the domination of apartments with public water supply and sewerage system, which also satisfy the criteria on the issue of building material, connecting to power system, possessing bathroom and kitchen, etc. However, taking into consideration that it is the older structures about, the share of apartments without central heating and gas system has still been very high.

Factor 2 - Substandard housing space: This factor reflects very bad housing conditions by the negative correlation with the share of apartments, as well as the positive correlation with the share of resided business rooms and rooms resided in need in total area of rooms that can (or have to) be used for residence. Nevertheless, relatively high positive loads of variables should also be noticed, which point to the share of land aimed to public services and the share between the number of work places and the population number. Hence, this factor, which mainly reflects the characteristics of the housing space, also explains indirectly the relationship among the basic functions of the city.

Factor 3 - Function of labour with orientation to the tertiary sector: The concentration of work places in the tertiary sector of activities has the highest load which determined the name of the factor itself. The total concentration of work places has very high positive load, and also (a little lower) the share of commercial zones and centres in total land purpose. The concentration of work places in the secondary sector has the positive secondary load. In other words, the height of the factor result reflects the significance of the statistical circle in the spatial distribution of the servicing sector, but also the functions of labour as a whole.

Factor 4 - Function of residence: The highest positive correlation this factor shows in the concentration of function of residence, and also with the share of apartments of the first category of quality, average age of apartments and size of an apartment house. These four indexes, basically, determine the character of the function of residence. Moreover, the high factor results reflect the small share of the oldest housing structures (built to 1918). The share of apartments of the second category of quality has the secondary negative factor load.

Factor 5 - Function of labour with orientation to the quaternary sector: The shares of public sector in total land purpose and the concentration of the quaternary sector of activities have high positive loads. The positive correlation of the secondary character is also shown in the concentration of work places as a whole. The spatial distribution of the results of this factor makes the explanation difficult by its high negative correlation with the concentration of work places in the tertiary sector. That means that the statistical circles with the significant role of the quaternary sector of activities or the function of labour as a whole have the high values of the factor results, as well as those with a small share of the tertiary sector.

Factor 6 - Function of labour with orientation on the secondary sector: three variables have high factor loads here: the share of work places in the secondary sector of activities has the highest positive load and then the concentration of the work places. The high positive correlation of the factors with the shares of economic zones and land aimed for conducting activities is in accordance with it. The negative load of the share of employed in the quaternary sector of activities should also be taken into consideration during the explanation of the factor results.

12.6. Zoning of social and physical space of Belgrade

The factor analysis represents good basis for the application of the method of multi-variation analysis – the method of grouping. The aim is the defining of relatively homogeneous groups (or zones) on the basis of the characteristics of the composite factor results. Ward's method of hierarchical grouping has been applied in this study with square of Euclid distance as the index of similarity. There are several ways of how to define the number of the homogeneous groups that should be selected. Besides the a priori defining of the number of groups, the analysis of the developments of the coefficients of fusion has mostly been used (Kovačić, 1994), so that this method will be applied in the chapter.

12.6.1. Zoning the social space of Belgrade

The distribution of zones of the social space is shown on the Figure 46. The mean values of the factor results by selected zones serve as the basis for their explanation (Table 38).

Table 38: Mean values of factor results by zones of social space.

Factor	Zone of social space				
	Zone of extremely urban social status	Zone of transitional social status with high standard of residence	Zone of suburban migration social status	Zone of rural social status	Zone of housing segregation
Φ 1 – Traditional social status	-0,81	0,09	0,64	2,54	0,13
Φ 2 – Phase in life cycle (family status)	0,34	-0,42	-0,32	0,97	-0,75
Φ 3 – Standard of residence	-0,15	1,34	-0,50	-0,60	-0,38
Φ 4 – Migration mobility	-0,34	0,09	0,83	-1,70	-0,43
Φ 5 – Housing segregation	-0,11	-0,28	-0,12	-0,11	3,51

The first selected homogeneous social zone is the zone of an extremely urban social status. It includes the greatest number of the statistical circles - 186, comprising 4.44 % of the territory with 26.61 % of total population. The selected zone has the lowest mean value of the traditional social status. Furthermore, the term traditional should be explained in the context of the previously defined complexity of the factor 1. This zone is also characterised by relatively older population, as well as the smaller share of families with children. The migration mobility is low, while the standard of residence and the level of the housing segregation are slightly below the average. The zone spreads over two old urban cores - Belgrade and Zemun. From the Belgrade core, it spreads radially in the direction of more significant lines of communications. The only statistical circle of this zone, located peripherally, is in the municipality of Voždovac, spreading over the part of the Jajinci settlement.

The second defined group is the zone of transitional social status with high standard of residence (or the zone of social chances), with 82 statistical circles, 15.54 % of the territory and 47.08 % of total population. This zone is characterised by the highest standard of residence. Consequently, the lowest value of the housing segregation has been dem-

onstrated. Besides above mentioned, the zone is characterised by the higher share of young and families with children. The levels of the migration mobility and the traditional social status are average. The selected zone is the largest by population, formed around the zone of an extremely urban social status. Two statistical circles of this zone, selected and periphery located, are in Dobanovci (the spatial unit which is irrelevant by population) and Borča.

The third zone – the zone of the suburban migration social status with 124 statistical circles, i.e. 67.01 % of the territory and 23.26 % of the population, has the highest degree of the migration mobility which is also its dominant characteristic. However, it is characterised by the expressive traditional social status, low standard of residence, as well as relatively younger population with higher share of pairs with children. The housing segregation is not typical for this zone of the social space which spreads over, proportionally, the greatest part of the territory of the GP of Belgrade, in the broad belt, formed around the zone of the high standard of residence.

The fourth selected zone is the zone of the rural social status. It spreads over 24 statistical circles, i.e. 9.69 % of the territory and only 1.11 % of the population. This zone has the extreme values in regard of the traditional social status (positive) and migration mobility (negative). Moreover, it is characterised by the highest mean value of life cycle and the lowest standard of residence. The housing segregation is insignificantly below the average for the territory of the GP of Belgrade. Generally, this is an extremely peripheral zone with low level of urbanisation, manifested through the traditional social status, high share of autochthonous population without noticeable immigration process, with extremely old population and low standard of residence. These indexes are also followed by bad educational structure and high share of the population employed in the primary sector, while proportionally the great part of households has its own agricultural farm. The zone of the rural status spreads over the area along the right bank of the Danube, from Višnjica in the north to Ritopek in the south, then Zuce, the parts of the settlements of Pinosava, Rušanji, Ovča and Borča.

The last zone is the zone of the housing segregation with 17 statistical circles, i.e. 3.32 % of the territory and 1.94 % of the population. The mean value of the factor results of the housing segregation is very high – even 3.51. The space is also characterised by the lowest mean value concerning the phase in the life cycle which points to the high share of young population, families with children, but also bad educational structure of the population. Except these extreme indexes, the selected zone is also characterised by the low standard of residence and small migration mobility. The index of the tradition of social status is slightly above the average. The zone of the housing segregation has, basically, the polycentric spatial distribution.

12.6.2. Zoning the physical space of Belgrade

The mean values of factor results by selected zones, as the basis for the further analysis of the physical space of the city, are given in the Table 39. The spatial distribution of the zones of physical space is shown on the Figure 47.

Table 39: Mean values of factor results by zones of physical space.

Factor	Zone of physical space					
	Old urban core	Suburban housing zone	Suburban rural zone	Industrial zone	Business centres	Zone of substandard housing conditions
Φ 1 – Centrality, accessibility and building of space	0,79	0,24	-1,32	0,19	0,35	-0,12
Φ 2 – Substandard housing space	-0,12	-0,11	-0,15	-0,16	-0,18	6,24
Φ 3 – function of labour with orientation on tertiary sector	-0,21	0,20	-0,20	-0,06	3,85	-0,12
Φ 4 – Function of residence	-0,39	1,62	-0,22	-0,10	-0,83	-0,20
Φ 5 – Function of labour with orientation on quaternary sector	0,17	-0,24	-0,18	0,28	-0,31	0,52
Φ 5 – Function of labour with orientation on quaternary sector	-0,28	-0,08	-0,19	2,87	-0,12	0,27

Figure 46: Zones of social space of Belgrade.

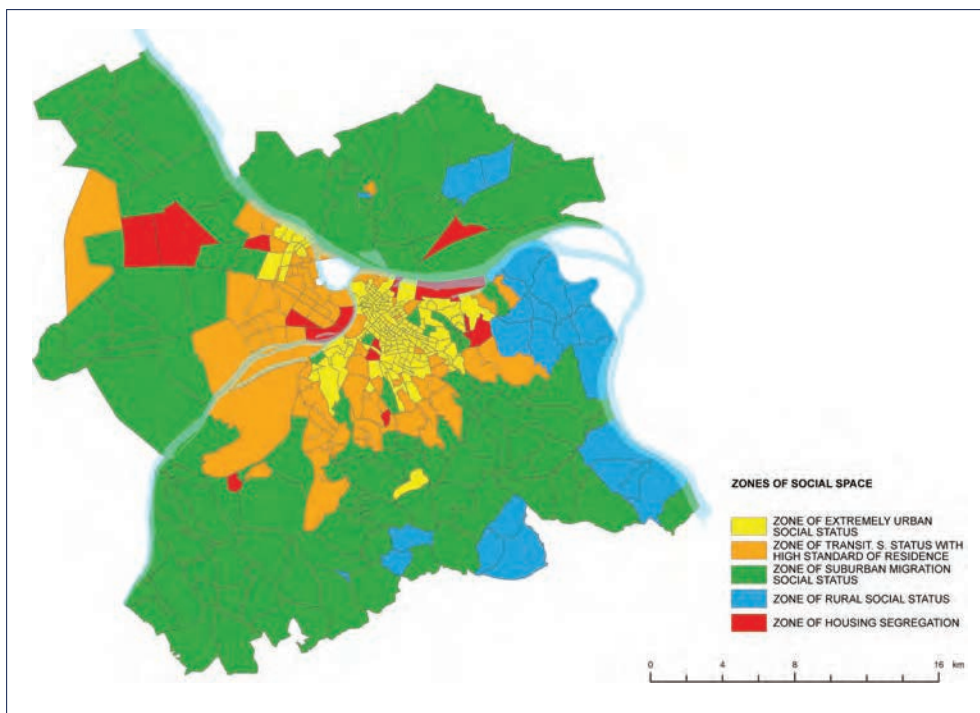
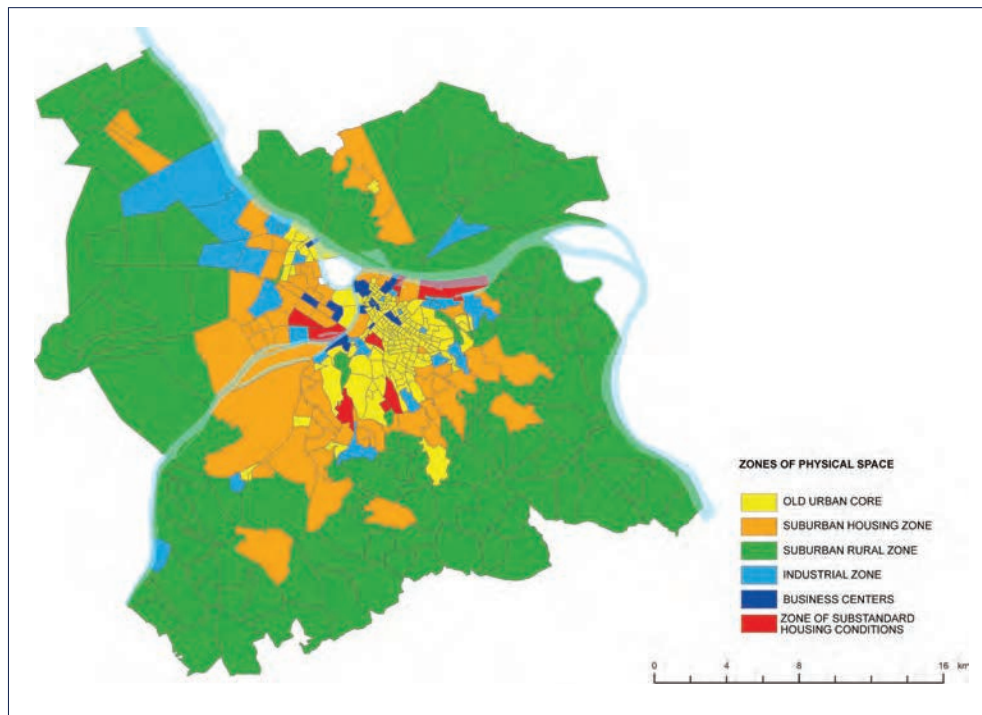


Figure 47: Zones of physical space of Belgrade.



The first selected zone of the physical space is old urban core. This zone includes the largest number of statistical circles (182), i.e. 4.63 % of the territory, 24.69 % of the population and 41.04 % of the work places. It has the highest degree of centrality, accessibility and building of space - it is characterised by high densities of work places and residence, with the insignificant share of agricultural areas, and the domination of housing areas. In the structure of activities, the quaternary sector is most common. Older buildings dominate, while the apartments are smaller on average, mainly of the second category of the quality (50.17 % of the area aimed for residence). This zone also has the lowest values of the function of labour for the secondary and the tertiary sector which corresponds to the small share of economic and commercial zones in the land purpose, as well as the small share and concentration of work places in these sectors. The relatively low function of residence speaks on low concentration of the population and the small share of larger apartment houses. The value of the substandard housing space is slightly below the average, while the functions of labour with the orientation to the quaternary sector are above the average. The cause of relatively low concentration of the functions of labour (except for the quaternary sector) and residence has been the shortening of spatial units in spite of their high densities. In the zone of the largest number of work places, the proportions of the sectors are: 0.53 % of the primary sector, 16.31 % of the secondary, 27.50 % of the tertiary and 55.67 % of the quaternary sector. The old urban core spreads over the inner central parts of Belgrade and Zemun, as well as the smaller, older part of New Belgrade. The zone expands from the centre of the city towards east and south, along the radial lines of communications. The peripheral statistical circles are at Kumodraž, the Rakovica settlement, old part of Žarkovo, Železnik and Borča.

The second selected zone is suburban housing zone with 71 statistical circles, 16.76 % of the territory, 52.13 % of the population and 21.97 % of the work places. It is characterised by high concentration of the population, the higher share of apartments of the first category (72.94 % of housing area) and large, newly built, housing constructions. The level of the centrality, accessibility and building of space is slightly above average, as well as the concentration of work places in service sector, but the concentration of work places in the quaternary sector is slightly below average and the share of land aimed to public services is low. The values of the substandard housing space and the functions of labour with the orientation to the secondary sector are insignificantly below the average. This zone, which is the largest by population, though situated mainly between the defined central zone and the periphery one, includes more distant spatial units with the higher concentration of the population (in Batajnica, Borča, Sremčica, Kaludjerica, etc.).

The third zone is suburban rural zone with 129 statistical circles, 71.73 % of the total territory, 12.98 % of the population and only 5.11 % of the work places. It has far lowest level of the centrality, accessibility and building of space. This zone, the largest by territory, represents the space of the low intensity of land use, with small densities of work places and places of residence, the lower share of housing tissue, whereas the share of agricultural land is higher. Moreover, 43.18 % of the total number of work places in the primary sector is located in it. In the structure of housing fund, individual houses dominate, often of the third category (83.63 % of the housing area). The suburban rural zone forms a wide periphery ring around other selected zones. The statistical circles that encroach into the central parts of the city are rare. Those are the areas of low population densities and densities of work places, with the very low share of housing tissue – the southern part of Senjak with Topčider Park, the part of Zvezdarska šuma, small areas in New Belgrade and Banjica.

The fourth zone is industrial zone with 28 statistical circles, 5.48 % of the territory, 8.22 % of the population and 13.71 % of the work places. Its main characteristics are defined by extremely high mean value of the function of labour in the secondary sector. As observed by the statistical circles, the share of the secondary sector of activities in the structure of work places ranges from 53.45 % to 92.39 % (averagely 70.62 % for the industrial zone as a whole). The influence of other factors is of much less importance, considering that their mean values ranges in the interval from -0.16 to 0.28. The quaternary sector of activities is the second by the significance in this zone, but with only 15.43 % of the total number of work places. Generally, the industrial zone has a dispersive arrangement, with higher concentration in the municipalities of Zemun and Palilula, while it also spreads over the peripheral spatial units (e.g., the part of Umka with cardboard factory). The largest continual space extends from Kolonija 'B' Zmaj to Zemun-polje.

The fifth zone of business centres includes 14 statistical circles, i.e. 0.43 % of the territory, 1.74 % of the population and even 13.64 % of work places on the area of GP of Belgrade. These centres are characterised by the extreme domination of labour function of the city over the housing function. The tertiary sector dominates in the structure of work places (which has high concentration in this zone) with 50.70 %, while the quaternary sector is the second according to the significance, with 36.59 %. These characteristics of business centres are caused by the highest mean value for the composite factor 3.

The lowest function of residence is also in accordance with the basic (labour) function of these centres. Other factors are of less significance. The mean value for the factor 1, which is above average, speaks on the central and more accessible position of the zone, as well as on the intensive usage of the space. Business centres also have the lowest mean value of the substandard housing space and the mean value of work places concentration in the industrial sector which is below average. The low mean value for the factor 5 should be explained in the context of a lower concentration of the quaternary activities and higher share of the tertiary activities. The business centres include the part of Donji grad in Zemun (where a community building of the Zemun municipality stands, market, etc.), blocks 32 and 29 (with the YAT, Post Office and Mobtel buildings, shopping centre, etc.), as well as blocks 19, 20 and 21 (with the Hyatt, Intercontinental hotels, Sava Centre, etc.) in New Belgrade. In the inner core of Belgrade, the business centres include the statistical circles wherein the bus station "Lasta" and Kalemegdan are situated, then the area between the "Danube" quay and Dunavski kej Street (where the companies of City Transportation "Belgrade", "Belgrade" Port, "Kompresor" are situated, etc.), area from Knez Mihailo Street, over Terazije to Nikola Pasic Square, area between Takovska, Kraljica Marija and Ruzvelt Streets and Kralj Aleksandar Boulevard, as well as the area among Nemanjina, Knez Miloš, Sarajevska, and Miloša Pocerca Streets (all three with many structures of the tertiary and quaternary sector of activities, such as retail markets, tourist agencies, shopping centres, faculties, embassies, sports centres). The last selected business centre includes Belgrade fair.

The sixth zone is the zone of substandard housing conditions. It includes 9 statistical circles, with 0.98 % of the territory, 0.24 % of the population and the significant 4.53 % of the work places. The most important characteristic of this zone has been very high mean value of the substandard housing area (6.24). In contrast to other zones of the physical space, in which the share of apartments in total area aimed for residence is 100 % approximately, the share is only 33.89 % in the zone of the substandard housing conditions. The resided business rooms dominate with 38.5 %, while the proportion of rooms resided in need is 27.54 %. The high mean value of the factor 6 is reflected in the average share of the quaternary sector in the structure of work places with even 76.37 %. Nevertheless, the significance of this factor is considerably less than the factor 2, so that there are territorial units of different structures of activities in the zone of the substandard housing conditions. The statistical circles with the dominant industrial sector include Ada Huja (with cardboard factory) and New Belgrade block 69 (with shipyard "Belgrade"). The servicing sector has the major share in the statistical circle, including blocks 66, 66a, 67, 67a and 42 (the traffic section of the City Transportation "Belgrade", the technical services of "Peugeot" and "Mercedes", etc.). The quaternary sector has the highest share in four statistical circles where Medical Centre of Serbia and Faculty of Veterinary Medicine are situated (in the Savski Venac municipality) and Military-Medical Academy and sports centre "Banjica" (in Savski Venac and Vozdovac). Two statistical circles do not have the significant function of labour: near the quay of "Dunav" and in Kosutnjak.

12.7. Relations between social and physical component of Belgrade

The canonical correlation is the method of the multi-variation analysis, which gives us the possibility to determine and quantify the relations between the two sets of variables (factors, in our case). This method has rarely been applied in the urban ecology, despite the need for explaining the relations between the social and physical subsystems of the city. In this analysis, two sets of variables are transformed into the orthogonal canonical vectors – the pairs of canonical variables. Each vector results with two canonical results respectively for each spatial unit. The essence of the canonical correlation lies in the optimisation of relations between two sets of variables, but not within those sets. As observed from that aspect, the canonical analysis is considered to be the logical continuation of the factor analysis.

The canonical coefficients reflect better the reality of the urban system through the complex relationships of interdependence than the simple or complex correlation. The results of the canonical analysis, in which the social and physical factors are used as variables, are given in the Table 40. The number of vectors that are going to be analysed should be defined before the interpretation of the results. In making a decision, the following indexes can be applied:

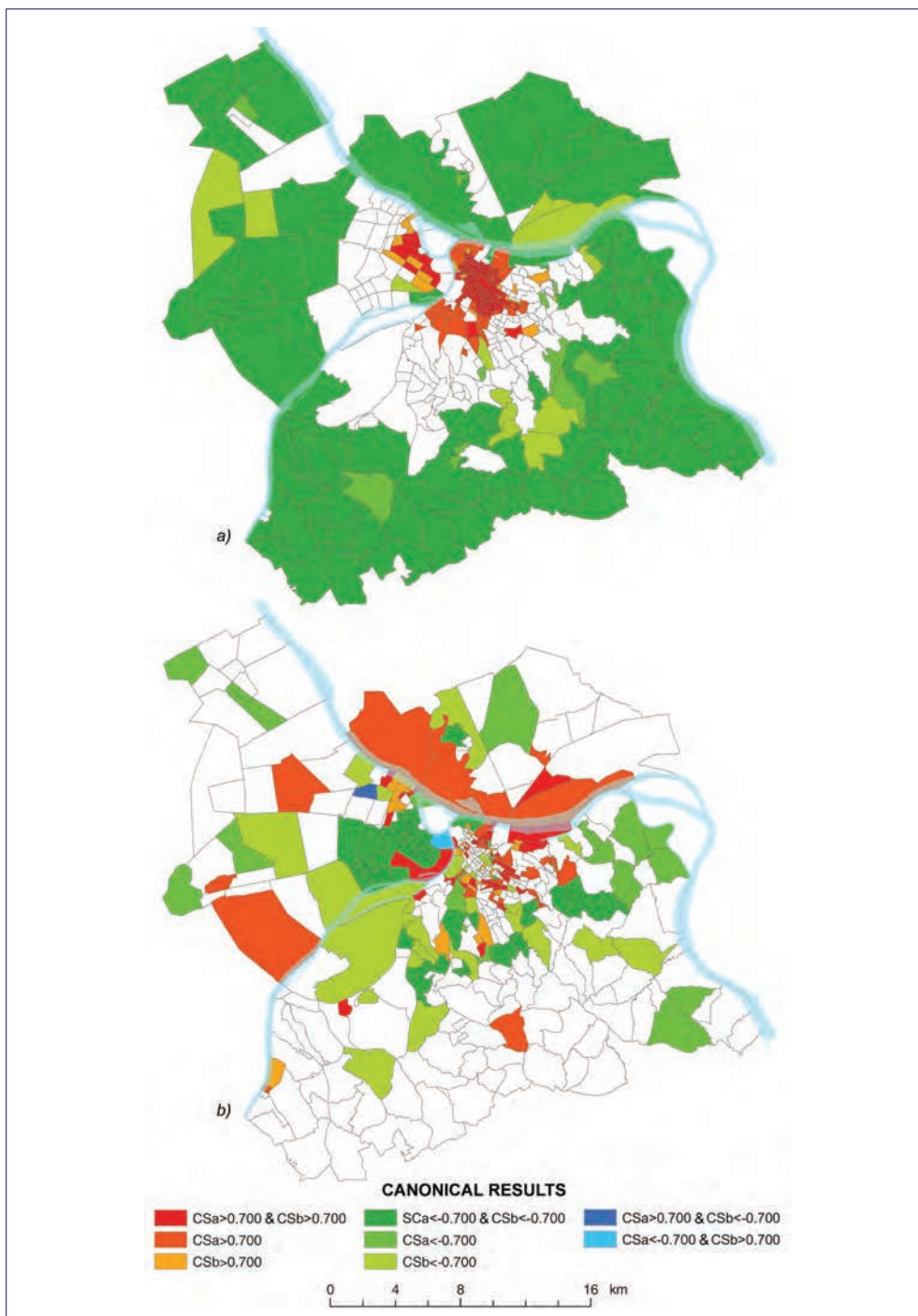
1. the level of statistical significance; 2. the height of canonical correlation; 3. the coefficient of redundancy. However, even the criteria on the a priori defined minimum values of all three suggested indexes are satisfied, the condition of the reasonableness of the defined connection among the sets of the original variables has to be satisfied in the canonical analysis (Kovačić, 1994). Otherwise, the statistical criteria are not enough for the acceptance of the validity of the vector. Moreover, there are opinions that only the first vector should be analysed as the most important for the explanation of the relations among the groups of variables.

The first pair of the canonical variables reflects the connection of the traditional social status (having in mind its negative sign) on one side, and the centrality, accessibility and building of space, on the other side. The influence of weighting of the standard of residence is a little lower, but still significant. The zone of high canonical results for both variables can be defined as the zone of urbanised social status and relatively higher standard of residence of population, which is also the zone of high centrality, accessibility and building of space. The second extreme, with the negative canonical results for both variables, is presented by the peripheral zone with the dominant rural social status of population and lower standard of residence, as well as low accessibility and density of building of space. The first pair of the canonical variables enables the clear separation of the centre and the periphery on the territory of the GP of Belgrade. The canonical results in this vector show the high degree of the spatial coincidence – out of 291 statistical circles with the absolute results higher than 0.700, even 219 have high values for both canonical variables. The clearer differences among the results of the variables are also obvious in the part of New Belgrade and Zemun, which is singled out as densely built area of high centrality and accessibility, but with insufficiently urbanised social status. Moreover, the zone with only the urban social status and higher standard of residence can be distinguished around the inner core of Belgrade. The similar transitional zones have also been present when it is the extremely negative canonical results about.

Table 40: Canonical coefficients and canonical correlations between social and physical factors.

Original factors	Canonical vectors				
	1	2	3	4	5
Social space of city					
Factor 1 – Traditional social status	-0,861	-0,391	0,138	-0,256	0,148
Factor 2 – Phase in life cycle (family status)	0,204	-0,083	0,403	-0,676	-0,577
Factor 3 – Standard of residence	0,387	-0,816	-0,363	-0,148	0,174
Factor 4 – Migration mobility	-0,243	-0,136	-0,460	0,331	-0,776
Factor 5 – Social segregation	-0,095	0,394	-0,690	-0,588	0,118
Physical space of city					
Factor 1 – Centrality,accessibility and building of space	0,955	0,164	-0,065	0,202	-0,074
Factor 2 – Substandard housing space	-0,058	0,398	-0,820	-0,388	-0,074
Factor 3 – Function of labour with orientation on tertiary sector	0,212	-0,232	-0,018	-0,438	-0,073
Factor 4 – Function of residence	0,048	-0,825	-0,498	0,227	0,019
Factor 5 – Function of labour with orientation on quaternary sector	0,179	-0,166	0,147	-0,560	0,710
Factor 6 – Function of labour with orientation on secondary sector	-0,066	0,228	-0,234	0,502	0,692
Canonical correlation	0,933	0,801	0,707	0,243	0,074

Figure 48: Canonical results: a) for the first pair of canonical variables; b) for the second pair of canonical variables (CSa - canonical results of factors of social space; CSb - canonical results of factors of physical space).



The first pair of the canonical variables reflects the connection of the traditional social status (having in mind its negative sign) on one side, and the centrality, accessibility and building of space, on the other side. The influence of weighting of the standard of residence is a little lower, but still significant. The zone of high canonical results for both variables can be defined as the zone of urbanised social status and relatively higher standard of residence of population, which is also the zone of high centrality, accessibility and building of space. The second extreme, with the negative canonical results for both variables, is presented by the peripheral zone with the dominant rural social status of population and lower standard of residence, as well as low accessibility and density of building of space. The first pair of the canonical variables enables the clear separation of the centre and the periphery on the territory of the GP of Belgrade. The canonical results in this vector show the high degree of the spatial coincidence – out of 291 statistical circles with the absolute results higher than 0.700, even 219 have high values for both canonical variables. The clearer differences among the results of the variables are also obvious in the part of New Belgrade and Zemun, which is singled out as densely built area of high centrality and accessibility, but with insufficiently urbanised social status. Moreover, the zone with only the urban social status and higher standard of residence can be distinguished around the inner core of Belgrade. The similar transitional zones have also been present when it is the extremely negative canonical results about.

The second pair of the canonical variables emphasizes the connection between the standard of residence, as the social factor, and the function of residence, as the physical factor (but both factors have negative signs). Both housing segregation and substandard housing space have relevant coefficients with positive signs. The high positive results for both canonical variables of this vector define the zone of low standard of residence of population, with emphasized housing segregation, where the substandard housing space dominates, while the housing function itself is weakly prevailing. The spatial units with high standard of residence and the dominant housing function, without more significant housing segregation have been the second extreme. In contrast to the previous pair of variables, the second pair does not show the high degree of the spatial coincidence - out of 202 statistical circles with high canonical results, only 95 have high results for the both variables. The specific, and at first sight, contradictory results have appeared in three statistical circles. Two statistical circles, closer to the centre of the city (near the business centre of "Ušće" in New Belgrade and between Pop-Lukina and Brankova Streets at Stari Grad), have low results for the social canonical variable and high for the physical canonical variable. It is the area where a small number of inhabitants live, so that the factor result has been extremely low concerning the function of residence. Moreover, the function of labour is much more significant than the function of residence, while the structure of the resided area itself is not favourable, which causes the high results concerning the substandard housing space. On the other side, the housing segregation has not appeared and most part of the population lives in more qualitative apartments (making a smaller part in total housing fund). In Zemun, one statistical circle has high result for the social canonical variable and low for the physical canonical variable. The isolation of the Romany population has been the main reason of it, causing high factor result of the housing segregation on one side, and high concentration of the inhabitants, i.e. the important function of residence, on the other side.

The strong influence of the social theory on the urban literature and severe criticism of the traditional ecologic approach have marked the last decades. With the radical social geography, the opinion spread that the progress in the quantitative methodology, manifested through the factor ecology, has just called attention to technical and empirical issues of the spatial distribution, thus steaming up the social processes that are in the basis of changes of the spatial structure of the city (Pratt & Hanson, 1988; Gottdiener, 1985). Many authors (Castells 1977; Harvey, 1973; Minigione, 1981; Scott, 1980) examined the specific urban issues concerning the broader social processes and historical situations, discussing the historical manifestations of the urban planning and their social consequences, the reproduction of labour, collective consumption, social division of labour and urban conflicts. However, it was gone too far even in the radical approach, which is partly the consequence of fear from the "fetishism of space" - giving space too much powerful and autonomous influence in the materialistic history and society. It was approached to the unnecessary limitation and the conceptualisation of space and spatial relations, straying from the theory on the interdependence and mutual supplementation of the urban society and urban space in the "socio-spatial dialectics". Among other effects, that was leading to the wrong interpretation and the rejection of important contributions of the members of the critical approach in the study of the city structure (Soja, 1980; Knox, 1991).

Urban, but also social geography as a whole, experienced relative fall in the quantitative and positivistic approaches. In the studies of the urban residential structure, the dominant quantitative methods of 1960s and 1970s were greatly changed by the qualitative and the so-called 'case study' approaches. There were not many attempts, with several exceptions (Davies & Murdie, 1991; Perle, 1981, 1982, 1998), to evaluate systematically the changes in the residential differentiation, considering that the ecological studies reached its zenith several decades ago. What has been ironical is that the removing of the factor ecology began just in the period of the increasing popularity of the factor methods in the specialised private sector and planned researches, especially owing to GIS and corresponding data bases. In this chapter, we have supported the reaffirmation of the quantitative analyses in urban geography, which would be based on the tradition of the factor ecology, but it would contain at the same time the important innovations, theoretical and methodological improvements, realised through the act of integrating the social component with the transportation, but also the overall physical component within the frames of the unique functional urban system. We are also of the opinion that the irrefutable fact is that the factor ecology, despite all limitations, gives widely acceptable method of the classification of the spatial units in the cities, as well as excellent starting point for further researches.

I 3. Economic aspects of spatial development of Belgrade

Radmila Miletić

Situation of Belgrade at the banks of the Danube and the Sava rivers, at the junction of the pan-European corridors VII and X, in the contact with areas of different economic-geographic distinctions are the main characteristics and at the same time comparative advantages of the position of the Belgrade region. The unique characteristics influenced the formation of the Belgrade urban agglomeration in the most significant developmental and integrative axis of the Serbian geo-space with expressed possibilities and potentials for inclusion into the regional flows of integration. In the Serbian spatial structure, the domination of the Belgrade urban area is evident, which is illustrated by data on the concentration of 21 % of the Serbian population, 40 % of the population of the higher level of education, 30 % of the total number of employed, 40 % of employed in servicing activities and 35 % of gross domestic product of the Republic of Serbia (in 2005). Unfavourable tendencies of the city economy development, demonstrated at the end of the last century, have been changed by the transitional stage which, starting from the market developing model and including the dimensions of sustainability, is directed to achieving the higher level of functional integrity and the competitiveness of the Belgrade metropolitan area.

13.1. Modern developing processes and urban-economic development of Belgrade

Based on the efficient use of resources and innovations, globalization unites the processes of the economic transformation, technological modernization and other aspects of the society transformation. At the same time, globalization and regional integration, influencing the change of the surrounding in which countries function, significantly change the role of the region and urban agglomerations, by favouring the cities as servicing, educational, financial and "know-how" centres. Megatrends (globalization, integration, market reforms and sustainable development) lead to changes in mutually stipulated processes with the corresponding consequences on the urban processes and land use. In the modern type of urban economy, formed in the world metropolises in the last decades, "the basic productive resource is information, the type of productive activity is the consistent processing, while the basic technologies get clear scientifically intensified character" (Grčić, Sluka, 2006, 130).

The transformation of the economic system in the developed countries, by the transition from the industrial production towards the development and diversification of the tertiary activity by the expansion of the development of different business and financial services (tertiary process), brought about the significant changes in the employment structure-sudden decline of employment in industry (deindustrialization). Thus, during the second part of the last century, the deindustrialization and the tertiary process became the recognisable characteristics of the economic structure of developed countries (especially metropolitan areas). The lack of investments in production-processing sectors had also negative economic and social consequences in the areas where the process was very expressive (Miletić, 2008, 4-5).

By the 1990s, deindustrialization was characteristic for the developed countries. East-European countries were in the worse position, comparing with the west-European countries. Along with the challenges and problems, above all of the economic globalization (and especially globalization of industry), the countries faced huge structural changes, caused by the fall of communism and transition towards market economy (change of proprietary, sector, organisational, spatial structure). The transformation of ex-communist countries from the centrally planned economy to market economy, led to the dramatic changes in their political, economic, social and ecological development. And while some regions were able to gain the advantage of the new situation, the others, faced with the serious problems, weakened significantly their position in local and regional frameworks⁶⁰. The tempo, direction and size of changes caused broad regional variations among countries on the international level, among cities and regions on the national level, among municipalities on the local level. How much the space, place and location can be re-evaluated on different geographic scale, is the result of the complex interaction, integration or conflict between the internal and external forces (Hamilton, 1999, 1350). The metropolises and capitals are determined as "leaders" for their diversified economy, qualified labour force, good infrastructure and existence of many institutions, good position in socialist economy and positive reaction to transformations⁶¹. Although they are large industrial centres, they achieved important progress towards modernisation and industry restructuring, while the reduction of job opportunities in the traditional production was compensated by opening new jobs in competitive industries and/or servicing sector. The industrial cities and regions which, opposite to "leaders", reacted negatively to the transformation are "losers" in the spatial development. They are characterised by specialised production, abandoned land and low qualified structure of labour. Nevertheless, the metropolises and capitals have continued positive continuity of development, even in the newly risen circumstances, and they still represent economic poles of growth.

Great structural changes that were happening in the economies of the countries in transition since the end of the 1980s also happened in Serbia, but with many specific features, due to different historic heritage and circumstances in which they were begun. Namely, Serbia entered the process of the economic transition later than other post-communist countries. Disintegration of the former Yugoslavia followed by the economic and market breakdown, wars, the economic blockade and sanctions, bombing, deepened dramatically the political and economic crises during the last decade of the 20th century. "The state of crises led to the decline of employment, especially in the secondary activities, large production centres bankruptcy and structural crises of economy

⁶⁰ On the impact of globalization and transition on transformation of cities and regions in Central and Eastern Europe, see: Horvath, G. (ed) 2000. *Regions and cities in the Global World*, Pecs: Hungarian Academy of Sciences-Centre for Regional Studies; Hamilton, F.E.I. 1999. *Transformation and Space in Central and Eastern Europe*. The Geographical Journal, Volume 165 part 2; Hamilton, F.E.I., Dimitrovska Andrews K., Pichler- Milanović, N. (eds) 2005. *Transformation of Cities in Central and Eastern Europe: Towards Globalization*. United Nations University Press; Enyedi, G. (ed) 1998. *Social Change and Urban Restructuring in Central Europe*. Budapest: Akademiai Kiado; Mrak, M. 2000. *Globalization: Trends, Challenges and Opportunities for Country in Transition*. In: *Globalization and the Integration of Industry in the Region*, Session I, UNIDO; Lorbel, L. 1999. *Economic Transition of Slovenia in the Process of Globalization*. Geographic Collection of papers XXXIX etc; the researcher paid special attention to the problems facing the industrial cities and regions in postcommunist countries.

⁶¹ Analysing the spatial development of the region, Gorzelak (1998) identified four types of regions, based on the position in socialist economy and reactions to transformation processes: leaders, losers, winners, and retarded regions. The first two types had a good position in socialist economy, but reacted contrary to transformations. On the other hand, tourist and border regions had bad position in centrally-planned economy, but due to its positive reaction to transformations, they are marked as regions-winners, while rural and peripheral regions are marked as stagnant or retarded regions, due to the bad position in earlier and negative continuity in later development (Gorzelak, according to Lintz, Muller, Finka, 2005, 5).

of the whole country, especially industrial centres and regions" (Grčić, Ratkaj, 2006, 97). Although the crisis of industry is present in all ex-communist countries, it has never been so much tumultuous and destructive as in Serbia. Speaking on the realization of the Spatial Plan of the Republic of Serbia, Zeković S. (2008, 73) stressed that, due to numerous socio-economic problems, conditions and difficulties of the last period, "one can note the dynamic development of the metropolitan area, while the growth of the not-fully developed regions, border regions, depopulation areas is in the significant variance".

The local, political and economic circumstances in the country in the last two decades, also including its transformation, limited the urban development of Belgrade. Belgrade is the metropolis with the legacies that were often limited in development, and with the developmental opportunities which inner and outer circumstances put aside, insufficiently or completely unused. Furthermore, the collapse was strengthened by the large number of refugees and displaced people, uncontrolled illegal construction, chaotic private initiatives in all fields of the economy with the collapse of the vital technical systems, transportation especially and basic economic capacities. According to the Report on the State of the City of Belgrade (2006, 8-11), the following radical changes are of the crucial significance for the city of Belgrade:

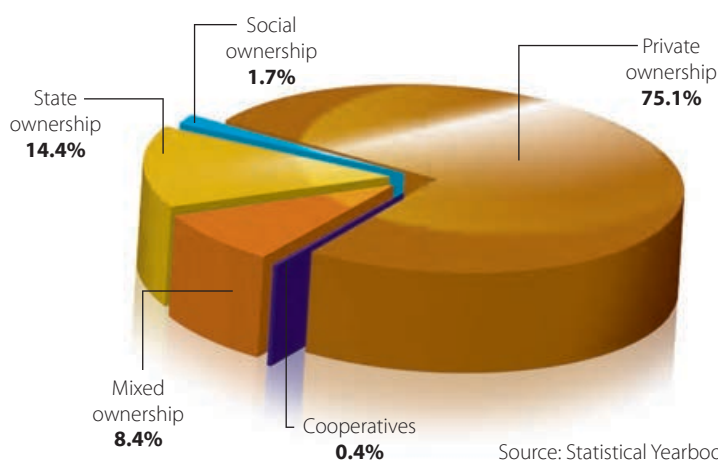
- the change of technological (development and usage of knowledge and intensive technology information) and production systems (growth of participation of service activities on account of processing activities), on one side, and changed forms of consumption, on the other side (growth of services, high-quality products, continually innovative design....);
- production systems in the world are becoming more integrated and open;
- loss of market due to sanctions against Serbia and open markets and development of economy of ex-communist east-European countries;
- by disintegration of the SFRY, the city of Belgrade, in the developmental sense, got the competitors in the capitals of the newly-formed and ex-communist countries;
- the investment in production, infrastructure and urban activities was insufficient during the last decade of the 20th century;
- the city of Belgrade has still remained the vital point of migration within Serbia; the migrations are intensified by immigration from the newly-formed countries, which caused the additional problems for the development of the city, among others, the rise of unemployment, etc;
- the change of property system and the process of the socio-economic-political transition retarded the dynamics of the economy and infrastructure development and generalised new problems in the city development;
- new production system and new understanding of things make education highly competitive and profitable, especially university education; the same thing is with the health service; culture may also have the important economic and developmental role;
- the developmental potential of the large city is not only in its size and chances for employment and business but in the quality of life, too-from there comes the new understanding of the problems of the environment, residence, security and safety.

The city has considerably changed its demographic and social picture, both quantitatively and qualitatively, by the dynamic changes of the population structure, with a large number of refugees and displaced persons and immigrants from the impoverished regions of Serbia, which has a significant influence on town planning and identity of the City and its parts. The investment of money is still insufficient. Disorderly city picture, illegal construction, social slums are still visible. The low material basis, political difficulties, destroyed and incompletely restored institutional system contributed significantly to considerably important retarded development. The recovery of the complex urban system (from economic, social, ecological, infrastructural and other aspects) has started at the beginning of the decade and it is still taking place with some oscillations, while the City of Belgrade has been gradually returning the image of the European metropolis and re-establishing the broken connections with the European countries, i.e. it has been gradually joining the European process of the regional integrations and cooperation in economy, culture and all other aspects.

13.2. Structural changes of Belgrade economy during transition

In the last twenty years, the economic development of Belgrade has been characterised by the similar features of the Serbian economy. The economic and trade recovery of Belgrade and Serbia has come after the recession, unstable economic conditions, transitional crisis, staff outflow, followed by the decline of gross domestic product (GDP) and employment (especially in industry), together with the obsolete equipment and technology, production loss, high level of indebtedness and illiquidity⁶². The constant increase of the economic development indicator is obvious. However, even after eight years of the recovery, GDP and living standards have still not come to the results from the end of the 1980s, but they are around 70 % of the level.(Gligorijević et al., 2008, 8).

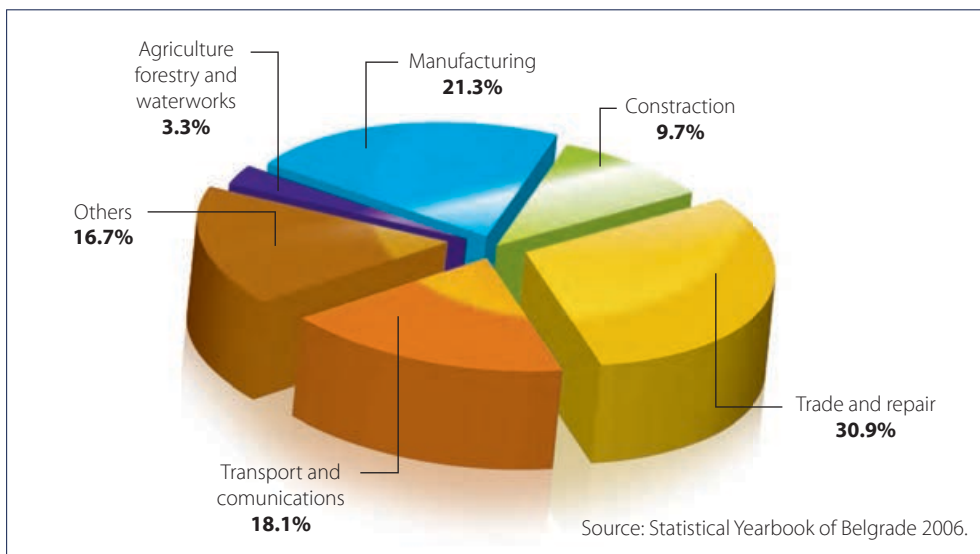
Figure 49: Structure of gross domestic (material) product by type of ownership, 2005.



Source: Statistical Yearbook of Belgrade 2006.

⁶² Survey of basic characteristics of city economy was based on: Report on the state of city of Belgrade (2006), Strategy of development of city of Belgrade-objectives, concept and strategic priorities of viable development-draft (2008), Organizations and financing of the city of Belgrade-analysis and impact on urban development(2008), General plan of Belgrade 2021. (2003), Regional spatial plan of the administrative area of Belgrade (2004) etc

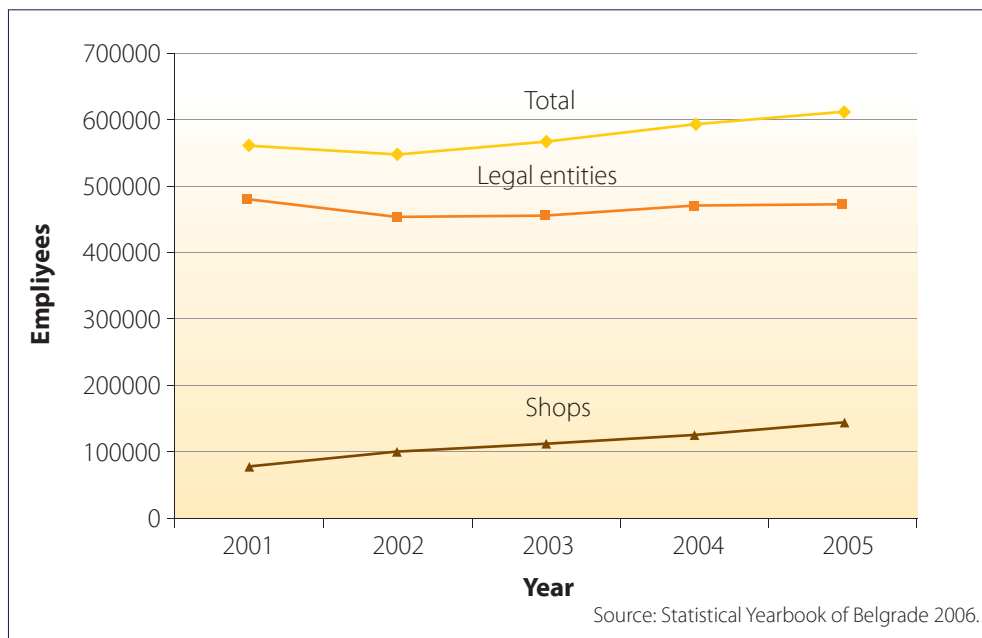
Figure 50: Structure of gross domestic (material) product by economic activities, 2005.



In 2005, GDP was around 4.6 billion euro, or around 2800 euro per capita. The rise is considerable comparing with 2000, but still less than 1989, when, at its highest level, GDP in Belgrade was 6.2 billion euro, while it was around 4000 euro per capita. Around 75 % of the city GDP has been achieved in private sector (42 % in 2002), while 8 % in joint property (even 34 % in 2002). In the structure of GDP by sectors, the share of the tertiary sector is the highest (69 %), whereas the shares of the secondary and primary sectors are 28 % and 3 % respectively; and by the type of activity-retail and wholesale trade(31 %), manufacturing industry (21 %), traffic (18 %), while other types of activities realize less than 1/3 of GDP (2005).

The share of some municipalities in GDP is unequal. The municipalities of New Belgrade and Stari Grad have an advantage (they realise together 1/3 of GDP of the City), while the suburban municipalities are falling behind (7 suburban municipalities participate with 12 % in GDP). The municipality of Stari Grad is a business/trade centre of the City with the largest number of shops and companies, and most economic activities are held there. Comparing with the previous years, the city business activity has been moving from the centre to New Belgrade. There is a tendency of New Belgrade becoming the main city business-financial centre, for many shopping centres and main offices of foreign banks (they came on this market in 2001) are located there. The main advantages of this part of the City are huge areas of free building sites, good town-planning system and infrastructure. These are the reasons that New Belgrade is going to be attractive as greenfield investment in the future.

Figure 51: Employees in Belgrade, 2002 - 2005.



The total number of employed in 2005 in Belgrade was 613.744 (30 % of total number of employed in Serbia), whereof more than 2/3 at legal entities, while less than 1/3 as self-employed, as shop owners, or employed in shops. Downward trend of employment was present from 1990 (607.619) till 2002 (551.298), when it started to rise slowly. Upward trend of number of employed in self-supporting activities started by the middle of the 1990s (the number of employed in this sector increased almost 9 times on the City level).

During the last ten years, the change of structure of employed according to the economic activities developed towards the decline of industry and mining (although still on the first place), from 27 % (1995) to 24 % (2005), while the tertiary sector had positive trend of employment, especially the wholesale and retail, from 10 % to 17 %.

Such employment structure is more favourable in Belgrade than in the Republic of Serbia, since, in percentage, the largest number of employed is in service industry, approximately 67 %, while it is 55 % in the Republic. Nevertheless, despite the positive trends, the share of service industry in total number of employed is still low, comparing with the share of this sector in some other European metropolises, for example Warsaw, Prague or Vienna (around 80 %). At the same time, there is the change of educational structure of employed (the rise of high school, junior college and university graduates from 46 % in 1990 to 60.1 % in 2005).

The changes are also visible in the territorial distribution of employed - the municipality of Stari Grad, which had the highest number of employed in 1995 (15.7 %), accounted for 12.8 % in 2005. The municipality of Savski Venac increased its share from 13.5 % to 14.2 %

and became the municipality with the largest number of employed. The municipality of New Belgrade also had more significant increase of the number of employed from 10.8 % to 13.2 %. Furthermore, more than 50 % of the total number of employed in Belgrade works in four municipalities (Savski Venac, New Belgrade, Stari Grad, Palilula). These facts support the fact that New Belgrade is becoming more and more business centre.

In 2005, the city of Belgrade had 143.294 unemployed, the unemployment rate was 20.2 % (Poll on labour force, Statistical Office of the Republic of Serbia) which can represent the long-term problem. The high unemployment rate is caused by winding up of many banks, restructuring of the large public properties, inadequate economic policy at the time before the democratic changes, as well as sanctions of the UN Security Council towards SRY. More than half of unemployed in Belgrade are seeking the job for the first time, which shows that the young population is dominant in age distribution. More than half of unemployed are women (57.8 %), while high school, junior-college qualification and university graduates personnel (50.3 %) are dominant in total unemployment.

The changes in the economy also affected the foreign trade. After the reintegration of the country into the international surrounding, the import grew faster than the export, which resulted in the continually dynamic increase of the foreign trade deficit. Despite the positive tendency of the weak export increase in 2005 and the import decrease, the level of foreign trade deficit is still high (both on the City and the Republic level), as the result of low competitiveness of domestic companies. The products of lower stage of processing (i.e. products of low value added) are still dominant in export, whereas the technological and capitally intensified products are dominant in import.

Trade recovery period is followed by the intensive investment activity. In the period from 2001 to 2006, the total volume and value of investments increased for about three times. The City of Belgrade participates for more than 50 % in total investments in Republic. According to the sectors of activities, traffic (32.7 %), state administration and social insurance (28.3 %), generation of electricity, gas and water (9.3 %) had the highest share in paid investments on the city level in 2004. The investments are the primary component of the economic development of Serbia and the capital, especially the foreign direct investments (FDI) under the conditions of low domestic accumulation. The first wave of FDI was realised in the tertiary sector. With the continuous positive results in carrying out the systematic reforms, their inflow in the primary activities can be expected, with the view to increase production and export. The highest volume of foreign direct investments has been accomplished in telecommunication (Telenor by privatization and Mobilkom Austria Group as greenfield investment), trade (Mercator, Metro Cash & Carry as greenfield investments) and banking (Banca Intesa, Alpha Bank) etc⁶³.

The economic structure of Belgrade, with the dominant tertiary-quaternary sector, defines its role as organisational, administrative, servicing, educational, scientific-research and culture centre. At the same time, there is industry modernization, which defines Belgrade as the significant industrial centre in the region. Although industry is not dominant activity, it was the factor of the development of Mladenovac, Lazarevac and Obrenovac within the city of Belgrade. Those centres spurred the development of industry by agglomerative forms and activities.

⁶³ According to SIEPA-Serbia Investment and Export Promotion Agency and publication Greenfield foreign direct investments in Serbia, Centre for liberal-democratic studies (2008).

More distinct polycentrism and decentralization of the business premises (trade, catering, tourism, handicraft sector, business and financial services, and other business premises in commercial zones) are traits of commercial activities in Belgrade nowadays. The traditional urban centres of Belgrade and Zemun gradually become less significant, especially in the field of trade, and consequently the area is considered to be inadequately and insufficiently used. On the other side, the business premises have very dynamically developed in especially attractive area of New Belgrade, where the modern and large-scale business premises are being built rapidly.

Taking into consideration the expected changes in the structure of the urban economy, which are going to happen in the forthcoming period, the dominant place of trade is expected. Beside the development of some domestic chain stores, in the previous period, the foreign chains stores (Mercator, Veropulos, Metro and Merkur) entered the market. They are imposing new business standards and new requests in regard of the skills of employed. According to some estimates, after the entry of foreign chain stores and the privatization of leading domestic retail trade, the following market classification was established: foreign chain stores make 20 % of market share, big domestic chain stores make 60 % of market share, small shops retain 20 % of market share (Report on the state of the city of Belgrade, 2006).

The industry sector (minerals and quarry working, processing industry, generation and supply of electricity, gas and water) makes 27 % of the city economy GDP and involves 24 % of the employed. Processing industry (about 75 % of employed and GDP and national income on the city level) is dominant in the inner structure of Belgrade industry, while the sub-sector of production and generation of electricity, water and gas is taking the lead in the implemented investments. However, the drop of production activity is followed by the decrease of industry role in GDP and in employment of the city⁶⁴. Demonstrated tendencies of industrial development indicate the more modern economic city structure in conformity with duties of the metropolis, where service industry of the city economy is going to strengthen and production-processing industry is going to decrease. The trends are followed by the structure of employed with the explicit problem of fictitious and latent employment, especially in industry. The highest concentration of industry is in the centres of the municipalities, with the very low dispersion of industrial capacities in other areas⁶⁵. The changes in the structure of processing industry are visible- labour-intensive production (clothing, yarn and textile, leather and fur industry) has been abandoned, and the production based on knowledge and development of new, technological and innovative services has been developing. Industrial activity develops

⁶⁴ Grčić, Ratkaj (2006, 98) pointed to the collapse of industry in Serbia and in Belgrade, presenting the figures that the number of employed in this activities was halved in Serbia in period 1988-2005 (from 947.984 employed to 451.700); the biggest reduction in absolute number was realized in big industrial centres (reduction in Belgrade was 76.280), with huge differences inside the Belgrade region- the biggest negative changes happened in the municipalities Rakovica, Zemun, Palilula, where mechanical, textile and other traditional branches are located (the areas mostly affected by negative effects on business at the end of last century and slow transformational processes during this decade).

⁶⁵ In spatial-functional structure, one can separate: 1) Belgrade as the essential part of development of industry with very diversified industrial structure; 2) Lazarevac- area of very high concentration of industry based on mining- power complex and industry based on development of extra-active industry, the centre of industry is outside the municipality seat; 3) areas of higher level of concentration of industry: Obrenovac with strategic electric-energetic complex and Mladenovac with diversified structure of industry; 4) municipalities Grocka and Surčin with growing significance of production activities and especially activities connected with warehouse and distributive functions (due to their position on inner-outer traffic routes); 5) municipalities Barajevo and Sopot have low industrial activities with growing trend of development of entrepreneurship (Miletić, 2003, Regional spatial plan of the administrative area of Belgrade, 2004). The differences in importance of industry in economic structure are obvious among the 10 central-city municipalities, for example, industry in Zemun, despite the absolute and relative decline, still has the important role; the industries in Voždovac, Palilula, Čukarica and

in numerous industrial and business areas. In most areas, industry is dominant and represents the factor of agglomeration of other activities. The most important areas are situated in the peripheral or edged parts of the continually developed city area in the vicinity of main and regional roads. One of the city advantages is the functioning of Free Zone of Belgrade (area of 8 hectares), with many economic activities (processing, warehousing, trade, etc). It is potentially the most dynamic form of agglomeration and generation of development in spatial-urban structure of the cities and wider surroundings, which is particularly emphasised in the Spatial Plan of the Republic of Serbia.

From the aspect of the city economy structure, the following conclusions can be drawn (Report on the state of the city of Belgrade, 2006):

- the more favourable structure of the economic activities comparing with the Republic (the tertiary sector makes about 70 % of the city GDP). The structure of the economic activities is more favourable in the urban municipalities than in the suburban municipalities (agriculture, mining and industry are dominant in the suburban municipalities, trade, civil engineering, traffic and other activities of service industry are dominant in the urban municipalities);
- taking 100 most successful companies, 38 are on the territory of Belgrade and make about 44 % net domestic profit;
- trade is the dominant economic activity on the city level (about 1/3GDP), with the tendency to be the basic holder of city economy in the forthcoming period;
- the most important energy resources in the country are in the Belgrade area (Obrenovac, Lazarevac). Mining industry is based on extracting lignite (Lazarevac). Food-processing, metal, and chemical complexes are dominant in processing industry. The following branches of industry distinguish themselves as propulsive: food-processing industry (milk, meat, vegetable, confectionery, and beverage industry), chemical industry (pharmaceutical industry, paints and varnishes industry, cosmetology, lubricant industry), metal-working industry, electrical manufacturing industry (telecommunications, refrigerant and measuring equipment), non-metals and building material (blocks and ceramics), paper industry, printing industry, graphic arts industry and recycling of raw materials;
- Belgrade is one of the few cities which can satisfy the needs for food industry by its own capacities in the primary agricultural production, as well as by its capacities for processing the basic agricultural products;
- the powerful expansion in building has started from 2001 and it is estimated the activity will demonstrate rising tendency furthermore;
- in accordance with its geographic location (cross of roads, railways and corridors, and position at the banks of two rivers), Belgrade has considerable potential for traffic development;
- tourism in Belgrade is on low standards in spite of high potentials. Belgrade has a chance to become congress, administrative, business and tourist centre of the region.

Moreover, one of the very important characteristics of the city economy towards the formation of the modern economic structure is privatization and restructuring of the existing companies and forming the new ones. In addition to the companies that were

Zvezdara have the significant role, but with the tendency of decline of significance; the industry in Rakovica stimulated the development during the intensified industrialization, but, nowadays, it has rapid downward trend; in municipalities Vračar, New Belgrade, Savski Venac and Stari Grad industry does not have important role in economic structure (less than 25%, even below 10% in structure of employed and GDP) (Miletić, 2003). It should be mentioned that the characteristics of so-called "negative deindustrialization" (one of the forms of deindustrialization according to Rowthorn, Wells, 1987) are still present. They were characteristics of other countries at the first years of transition, and their features are: worse characteristics of economic sector, retarded output and productivity of the sector, which results in decrease of competitiveness of the products; on the other hand, redundant workers from industrial companies cannot work in service sector.

privatised by method of being taken over by the employed (act from 1997) and whose minority parcels of shares are sold on Belgrade stock exchange, there is a group of about 500 Belgrade companies which is going to be privatised by The Law on Privatization from 2001. The auction sale, from the anticipated 464, was carried out for 262 companies (56 %). The sale by tender, from the anticipated 36, was carried out for 8 companies (22 %). Moreover, 14 Belgrade companies are expected to be privatised by restructuring. Still, the privatization has reached not a half of the business sector. The competition of the process of privatization is the basic supposition for creating the efficient real sector which can provide the rise of the competitiveness of the Belgrade economy.

Table 41: Privatizations in real sector on the territory of Belgrade, February 2006.

Method of privatization	Status	Number of companies
Tenders	Sold	8
	Unsold	28
Auctions	Sold	262
	Unsold	202
Selling of minority shares		168
Restructuring		14

Source: Agency for Privatization, according to the Report on state of the city of Belgrade, 2006.

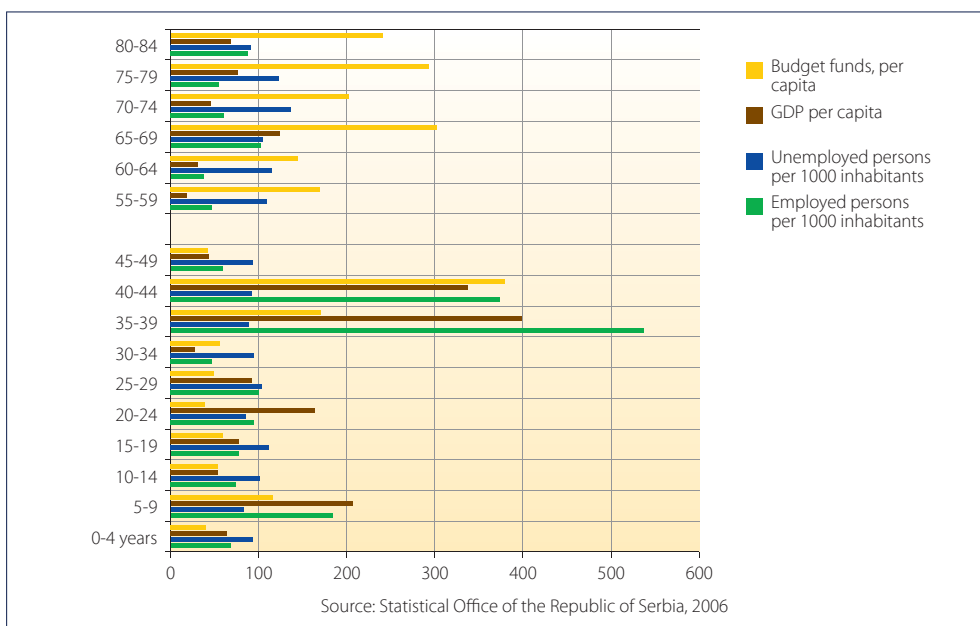
There is a considerable number of public companies which need restructuring (financial consolidation, organizational restructuring with the solution on the problem of redundant labour) and choosing the right modality of the future functioning through the privatization or administration by the city management or special arrangements (for example, the partnership between public and private sector).

After more than a decade of Belgrade economy devastation (country devastation, as well), the growing trend of GDP testifies on the intensified trade recovery of the City, especially from 2001, with the private property domination, while in the structure of the activities, the tertiary sector dominates. The number of legal persons in Belgrade considerably increased—from 67.542 in 1995 to 86.941 in 2005. Nevertheless, approximately 84 % of companies are in private property, whereas the companies with foreign or joint capital make around 10 %. The largest number of legal persons, even 46 %, is in trade, followed by financial and commercial services with 16 %, industry and mining with 10 %. The largest number of legal persons in the territorial structure is concentrated in the municipality of New Belgrade (17 %). Additionally, the trend of the increase of number of shops from 44.124 (2000) to 53.003 (2005), indicates the growing significance of the entrepreneurship as an organizational form of the economy; 142.852 people are engaged in relation to 100.449 in 2000. At the same time, the change of interrelationship of these two categories of the economic entities is proceeding, in favour of employed in shops with 84 %:16 % in 2000 to 77 %:23 % on the City level. In the municipalities of Barajevo, Grocka and Sopot, the dominant number of employed is in shops (in the Sopot municipality even about 80 %). This is the illustration of the role of the market mechanisms of the allocation of the new economic matters in the metropolitan area of Belgrade.

13.3. Evaluation of state and problems in development of city economy

One of the key weaknesses of the city economy is low economic competitiveness: the process of privatization of social companies is not finished, it is at the very beginning in the companies with the state capital, the process of production restructuring is retarded, while the process of the specialization is not expressed, the underdeveloped business on the market principles (underdeveloped institutions with market structure, insufficient number of powerful companies, especially small and medium-size companies as bearers of development, just initial forming of clusters as efficient instruments for strengthening the competitiveness of companies and the region, technological backwardness)⁶⁶. The inadequate structure of industry, insufficient representation of propulsive production segments, implementation of innovative technologies and ecologically acceptable products, redundant labour are especially unsatisfactory. The unevenness in the concentration of the economic capacities (they are primarily located in the inner city area and in the centres of the municipalities in the outer city area), the absence of modern areas for business and industrial activities (for example industrial/technological parks, incubators etc) are present in the territorial organization.

Figure 52: Selected indicators of socio-economic development 2004.



Notes: City of Belgrade=100; the municipality of Surčin is shown within the Zemun municipality.
Source: Statistical Office of the Republic of Serbia, 2006.

⁶⁶ 7 According to indicators of ranks of international competitiveness prepared by World Economic Forum (WEF) in »Global Competitiveness Report«, Serbia ranks 80th (102 analyzed countries) according to index of global competitiveness, and 86th (116 analyzed countries) according to the index of business competitiveness (Report on state of city of Belgrade, 2006). As stated in the Strategy of regional development of Serbia for period 2007-2012 (2007) the value of approximate annual transitional index (European Bank for Reconstruction and Development -EBRD monitors 9 transitional indicators in structural and institutional reforms in countries in transition) is 2.7 for Serbia; even 20 countries (out of 28) were more progressive than Serbia.

The second economic weakness is insufficient cohesion in the area of the City, which is demonstrated by: the important differences in GDP per capita among the municipalities, especially urban and suburban (ratio 16:1); differences in height of the government revenues per capita (ratio higher than 1:10); the level of employment among municipalities etc. The city economy is characterised by the insufficient utility equipment in some parts of the city, outstanding property-legal problems, depopulation and inadequate legal certainty. The special problem is the inadequate offer of the locations-either inadequate purpose or insufficient profitability for the investors concerning town-planning elements defined by regulation and detailed plans (Strategy of development of the city of Belgrade, 2008). Almost all offers of the locations still relate to the municipality of New Belgrade.

The following weakness is the insufficient utilization of potentials the City has - traffic, transportation and other activities, especially tourism. Moreover, there are great agricultural potentials and processing capacities which enable supplying the urban population and including the offer of large trade centres (opened in Belgrade in previous years). However, they have not been exploited appropriately, so that the activation of the territorial capacity is also inadequate: about 150.000 people are on labour market, the industrial zones are non-activated or insufficiently and inadequately used, tourist potentials are unused, hotel capacities are insufficient and often have inadequate quality and offer.

The general conclusion is that Belgrade has not used fully its potentials and resources (location, natural, demographic, infrastructural, already-built investment funds etc). The further economic development, i.e. the strengthening of the competitiveness of the City of Belgrade and the more complete mobilization of the territorial capital will greatly depend on removing the obstacles that retard it and make difficult: the slowness of the process of integration in EU, political instability, ineffective transformation processes, incomplete legal framework of the economic development, further polarization within the Belgrade region, absence of partnership between public and private sector, deficiency of funds (especially FDI), slow change and inadequate specialization in the production and service industry (traffic, tourist, etc.); inadequate attitude to natural resources and high-quality economic infrastructure; passiveness and lack of particular programs for attracting the investors and using the specific-purpose funds (domestic and foreign); non-competitiveness of prices, quality of products and services; insufficient co-operation among the municipalities on the area of the City and the institutions of the surroundings, among the economic agents (industry, agriculture, tourism, trade, finances etc); potential conflicts between the various users of the area and high level of the environment endangerment.

13.4. Transformation of spatial structure of city economy - new poles of development in urban structure of Belgrade

Under the pressure of global processes of the economic development, the transition of the socio-economic system towards the market economy in Serbia, influences, among

others, the new economic poles in urban areas, the changes in the spatial distribution of the cities, the new location-spatial forms of industry, the servicing activities etc (Zeković, 2008, 61). These mutually connected changes are the most impressive in the spatial-economic structure of Belgrade. Beside the processes of deindustrialization and the tertiary process, the privatization of the public companies plays the important role, as well as the investments (either as greenfield or brownfield investments).

Due to the general trend of moving the production from the city centre to the periphery, as well as the locations of both new production and servicing capacities, the new poles of the development are being formed in the periphery belt of the City (Zeković, 2008, 67-69). Two basic types of the economic poles of the development in urban environment are: 1) 'dynamic'-shopping centres, developing airport zones, technological parks, zones of business-commercial activities in the urban periphery and 2) "stagnant"-traditional industrial, working zones, military installations etc, with the largest number of industrial brownfields. The new poles of development are the mixture of old regional models (reconstruction of neglected industrial locations-brownfield) and creation of new location-spatial and development models in the urban tissue (greenfield). Moreover, the construction of new business facilities at new locations in the edged parts of the city, very low utilization level and conversion of industrial zones and complexes are the dominant trends. According to the figures of Investment Climate Assessment (2004), new 20.000 hectares of building land (agricultural land) in the periphery area of Belgrade were occupied by 'new wave' of the construction. On the other hand, the various problems and restrictions burden the activation of brownfield locations. The point in question is often about companies in bankruptcy, burdened by property rights, not yet privatized and /or on neglected locations. Their reactivation is slow and expensive. Moreover, it is about the vast areas in urban complexes that need revitalization.

According to the location-developmental potential, the areas at inner-outer traffic routes, near the highways, ring roads, meeting places of roads of different level, where many attractive locations are activated for building the facilities of large capacities (shopping centres, hypermarkets, shopping malls, modern industrial zones-Gornji Zemun, Highway etc) can be distinguished. The forms of decentralization also include the centres of new settlements, transformed local centres, smaller commercial activities in the very city tissue, special business complexes, etc. It is realistic to expect the gradual transformation of the existing economic zones, especially those located centrally, into service-commercial centres (distribution centres, servicing centres, large trade centres). The commercial activities already have and are going to have even more important role, as the basic originators of development and change, i.e. originators in approaching the economic structure to the level of the development in large European cities. The polycentric system lowers the costs of communication and balances the development, spurs the city cohesion by standardizing the layout of the business premises on the whole territory of Belgrade (The Strategy of development of the city of Belgrade, 2008, 41).

It has already been mentioned that the area of New Belgrade has been very attractive for the development of the servicing-commercial activities (GTC business centre, Airport City Belgrade, Delta City, Merkator, Imocentar, Belexpo etc) due to large areas with the existing infrastructure. The following locations are the most significant for brownfield investment in Belgrade: business-warehouse zone at the banks of the Danube (from the

Port of Belgrade to Ada Huja) as very attractive for the transformation into the commercial-recreational zone; the areas on the Sava amphitheatre (for decades projected for the transformation into the main Belgrade commercial zone) and many other locations within the urban tissue and the centres of the development of outer city area.. The concentration of the economic activities increases along the highway from Belgrade to Batajnica, Novi Sad, "Nikola Tesla" airport, Dobanovci, Zemun, road to Pančevo. The dislocation of the business and warehouse capacities from the business zone around the port of Belgrade to the Surčin-Dobanovci business zone can be noticed, which is becoming the very important centre for the logistic-distribution services due to very good accessibility (meeting place of Corridor X and Belgrade ring road, close to the airport, favourable grounds for building etc).

Beside the area within the borders of Belgrade, the metropolitan periphery is becoming extremely attractive for agglomeration of business activities (for example, the zones along the highways Belgrade-Novı Sad, Belgrade-Zagreb, Belgrade-Nis, along the Ibar route, the Avala route, the Zrenjanin route, etc). The significant concentration of the economic activities developed at the border of the Belgrade agglomeration, near the highways, in the adjoining municipalities with better transport and communication with Belgrade and with efficient business and investment-orientated local government.

As regards the modern spatial forms for business activities (e.g. industrial/technological parks), or the forms for supporting the development of small and medium-size companies and creating the conditions for the commercialization of the research work, on the territory of the city of Belgrade, the scientific-research park 'ICSE'-Institute for Chemical Sources of Electricity in Zemun (2006) was founded as the first in Serbia in fields of technical-technological studies, as well as Business-Technological Incubator of the Technical Faculties in Belgrade (2007). By the spatial and town-planning documents, the modern forms are expected in Lazarevac, Surčin, etc. As for the support of development of small and medium-size businesses, in cooperation with the Regional Office for Development of Small and Medium-Size Businesses of Belgrade, Belgrade Chamber of Economy and other relevant city and regional institutions, there are offices for the support of the local economic development in several municipalities (Voždovac, Obrenovac, Transitional Centre of "Kolubara" mining basin in Lazarevac, Obrenovac, etc).

One of the city advantages is functioning of Free Belgrade Zone (area of 8 hectares), with numerous users (79) and economic activities (processing, warehousing, trade, informatics, pharmacy etc) and around 600 employed. It is the dynamic form of agglomeration and generation of the development in the spatial-urban structure of the cities and broader encirclement.

I 3.5. The concept of spatial development of Belgrade economy - towards modern spatial-functional organization of city economy

According to the Strategy of Spatial development (2001, 9), the basic objective of the development of the City of Belgrade is "organized activation of the spatial potentials of

the City, based on the principles of the sustainable development with increased attractiveness and provided conditions of achieving the level of the European metropolis" by means of the conceptual organization of the economic spatial complex of the development on new structural basis. The approach of Serbia to European structures requires the change of assets and mechanisms in the system of national territory in order to overcome the economic, social and ecological problems at the time of extensive development of Serbia. As stated by Grcic (2002, 71), new domestic and foreign socio-economic, geopolitical and ecological conditions of high quality, characteristic for the end of the 20th and the beginning of the 21st century, impose the modernization of the existing model of the territorial organization of the City of Belgrade. It is connected with: 1) the use of new, integral access in the territorial organization of the settlements, 2) the use of new technologies in the construction and exploitation of the environment, 3) preservation and efficient usage of natural resources, 4) elaboration and use of differential system of enactment for the territorial and settlement organization.

The strategic developmental directions of Belgrade metropolis refer to:

- the strategy of the sustainable development of the city economy oriented on decentralized concentration of population and activities, the qualitative development as a priority, the compensation of ecological damage on the regional level on the occasion of taking new grounds for industry and residence, establishing and developing the regional system of tourist-recreational zones, the co-ordination of transport with the ecological principles of development, creation of technical infrastructure for processing and disposal of waste;
- functional territory zoning by separating the zones of special regime of functioning, so the territory of metropolis would be made of three macro-regimes: macro-regime "natural environment" with mostly natural ecosystems and tourist-recreational zones, macro-regime "rural environment" with agricultural zones and macro-regime "urbanized environment" with urban and suburban areas (including "industrial zone");
- forming system of complementary cities (centres) within the Belgrade metropolitan, for the "globalization is connected with the process of suburbanization which cancels the traditional division of functions between the urban centre and periphery" to the interest of uniting the potentials of small and medium-size centres in order to compete on the market more successfully and to join the trans-border regional initiatives with more important role of local city and municipality government in the process of planning and decision-making (Grcic, 2002, 74-76).

Under the conditions of numerous developmental restrictions, high degree of business uncertainty and initiated structural transformational processes, the better usage of the spatial benefits and overcoming of demonstrated problems and development restrictions, refer to the need of using the integral approach. The ecological dimension of viability comes into the foreground due to the concentration of ecologically highly- risky branches of industry and capacities on relatively small area of the Belgrade region and in its direct encirclement.

In the period from 2000 to 2004, the City of Belgrade revised its developmental objectives and coordinated the spatial documentation with changed social, legal and economic atmosphere through the elaboration and carrying out of two strategic plans - General Plan

of Belgrade 2021 (2003) and Regional Spatial Plan of the Administrative Area of the City of Belgrade (2004). In that period, the public projects of great significance for the capital were started, such as plans and projects for highways or public transport of high capacity, projects resulted from direct foreign investments for the construction of business, commercial and residential zones (Gligorijević et al., 2008). In recent times, The Strategy of Development of the City of Belgrade (2008) was made with the aim of more qualitative development of the City. Additionally, several sector strategies of the development (tourism, agriculture, trade) are in the process of adoption.

According to the Draft Strategy of Development of the City of Belgrade (2008), the basic developmental principles refer to the growth of competence, identity, cohesion, polycentrism, accessibility and promotion of the city government. The concentration of the development of the city economy includes orientation towards new, modern business-service structure and development of wide spectrum of the productive, sustainable, payable and propulsive economic activities. The main objective of the city economy is the continuous, dynamic, co-ordinated and competitive growth and development fitted into global visions and trends of the development of Europe and the world, trans-regional integration flows and international division of labour. The development is based on the principles of the sustainability and cost effectiveness, knowledge, market-proven quality of goods and services, strategic comparative advantages of the City and recognizable identity in the regional frames. The completion of the basic strategic objective of the economy of the City is closely connected with the realization of the following operational goals and tasks:

- use the existing potentials of the City for forming the competitive economy and providing prosperity (to make the process of restructuring faster, improve the business efficiency; develop and promote Belgrade as an innovative, traffic, service and business centre; improve the city image as a favourable business environment; make high-quality partnership between public and private sectors, etc);
- provide the economic activity consistent with the city needs and potentials; consider the characteristics of the urban area: urban and historic background, new business and shopping centres, industrial/technological parks, production zones, tourist zones, rural areas, brownfield areas, etc.; support the development of smaller urban centres; find balance between the development of services and production, etc;
- provide the financial resources for the realization of the strategic objectives: use rationally the property and the existing financial resources; consolidate the financial-investment potential from its own sources of income and by partnership with the private sector, especially on strategic infrastructural projects, define the relationship among municipal and city budgets and other public funds in satisfying the specific needs of the City, use the instruments of fiscal, land and communal policies for attracting and directing towards brownfield and greenfield investments;
- provide the higher employment, as one of the most significant indicators of the economic and social development: opening an ever expanding number of high-quality jobs based on the entrepreneurship, innovations and investments in capacities, developing the stimulating investment ambient as the support for starting the business, permanent investment in people, self-employment, employment of trainees, re-training and additional training, etc.

Regarding the spatial aspect, the access roads to Belgrade, highway zones, ring roads and crossroads with local roads (today less activated zones along the highways Belgrade–Novi Sad, Belgrade–Zagreb, near the Ibar Highway) will gain in importance in the forthcoming period. The formation of the new spatial structures (industrial, technological and business parks, entrepreneurship zones and complexes, shopping centres, logistic-distribution centres, etc) is being expected. Moreover, the gradual transformation of the existing business zones (brownfield locations) is imminent, especially those near the central parts of the city, which will get commercial and other acceptable urban contents (distribution centres, servicing centres, big shopping centres).

The development of infrastructure, investment in knowledge, stimulation of the development of small and medium-size companies, promotion of system of public investment, will be the mechanisms by which the City and local communities can influence the change of the existing economic structure. In such a way, the conditions can be made for more comprehensive inclusion and economic valorisation of unused capacities and territorial capital on the whole area of the City.

The Belgrade urban agglomeration has dominated in the spatial structure of Serbia with 21 % of population of Serbia, 40 % of population with college degree, 30 % of total number of employed, 40 % of employed in service sector and 35 % of Serbian GDP (2005). The unfavourable tendencies of the city economy development, shown at the end of the last century (disintegration of the former Yugoslavia, market reduction, wars, economic blockade, bombing, large number of refugees and displaced persons, economic collapse), are followed by the transitional phase, which is, starting from the market model of development and integration of sustainability, oriented towards reaching the higher level of the functional integration and competitiveness of the Belgrade metropolitan area.

The demonstrated tendencies of the economic development during the last few years, have pointed to the formation of more modern structure of the economy of the City, consistent with the functions of the metropolis. The service sector of the city economy is still going to strengthen comparing with the reduction of the production-processing sector. Thus, deindustrialization and the tertiary process are becoming the recognizable city economic features by the middle of the decade. Moreover, the transformation of property structure is evident with the significant share of the private ownership and the trend of development of small and medium-size companies and entrepreneurship. Besides the progress, the low competitiveness of the city economy is still evident (retarded processes of restructuring on all levels-ownership, sector, technological, organizational etc), cohesion of the city area is insufficient, uneven development, insufficient use of the potentials for the economic development. The transformation of the economy can be seen through the changes of its spatial dimensions. The new poles of the development appear as the combination of old spatial models (by reconstruction of neglected industrial locations-brownfield) and creation of the new location-spatial and developmental models in the urban tissue (greenfield)-shopping centres, hypermarkets, shopping malls, business parks, initial founding of industrial /technological parks, etc. In the spatial-functional structure of the City of Belgrade, according to the location-developmental potential one can distinguish the space on inner-outer roads, near the highways, ring roads, meeting places of roads of different rank where many attractive locations for building high-capacity facilities have been activated.

The concept of the development of the city economy includes the orientation towards new, modern production-service structure, based on the principles of the sustainability and market, with the orientation to decentralised concentration of activities and polycentric development. With the view of more efficient, uniform and high-quality development, the strategic developmental and spatial-planning documents have been adopted during the last few years or they are in the process of adoption. They revised the development objectives, coordinated with the changed social, legal and economic setting-General plan of Belgrade 2021 (2003), Regional Spatial Plan of the Administrative Area of City of Belgrade (2004), Strategy of Development of the City of Belgrade-draft (2008) etc.

I 4. Road traffic in Ljubljana

Matej Ogrin

Although Slovene roads are in general considered to be among the less busy European roads, road traffic is currently experiencing major changes. This can be seen in the rapid growth of freight transport, mostly transit traffic. During the first years of independence, traffic was very light in the country and, due to the instable economic and political situation, nobody predicted the changes that would occur in the next 15 years. Nevertheless, economic growth after 1995, gradual stabilization of the situation in the republics of the former Yugoslavia and the revived upswing of tourism on the Adriatic coast put Slovenia on the map as one of the relatively important transit countries of Europe by 2000.

Economic growth resulted in a rapid increase of motorization, leading to 517 passenger cars per 1000 inhabitants in 2009. The building of motorways and the revived upswing in tourism have contributed to the growing importance of Slovenia in terms of tourist transit. Economic growth and the increase of motorization can be observed in neighbouring countries as well, especially in Croatia and Hungary, since Austria and Italy had already reached this level.

Figure 53: Highway system in Slovenia.

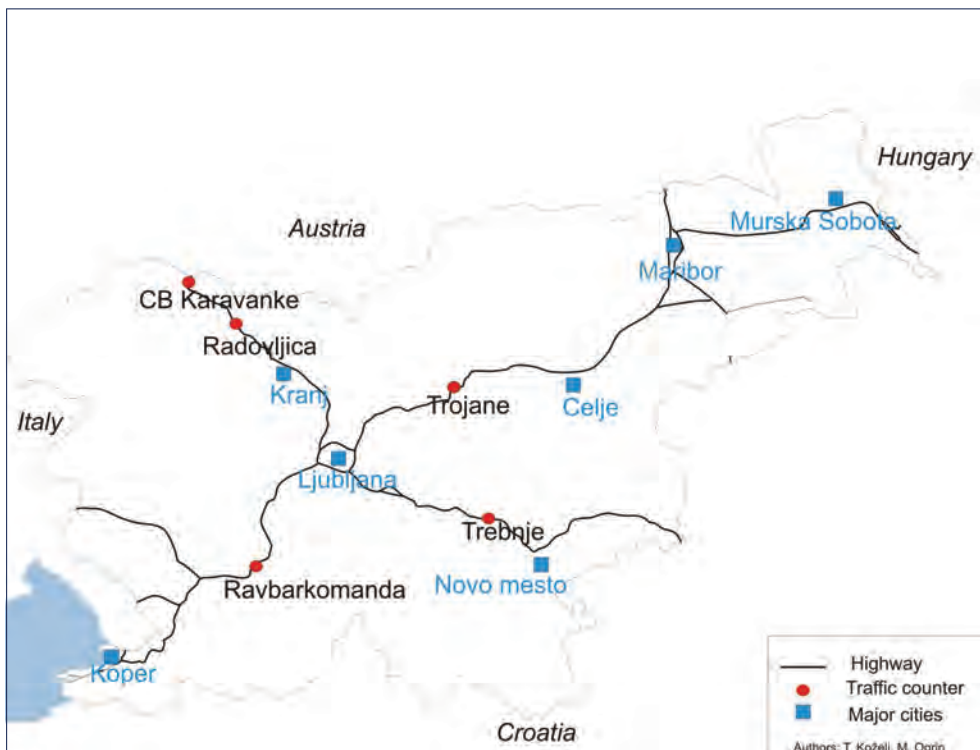


Table 42: Traffic on motorway crossing sections 1992 – 2009.

Method of privatization	1992	1994	1996	1998	2000	2002	2004	2006	2008	2009
BC* Karavanke (A1)	2.344	3.732	4.644	4.735	4.950	5.652	6.100	6.283	6.604	6.681
Radovljica (A1)	12.386	16.139	20.675	21.859	23.806	24.904	26.402	27.195	27.709	/
Trebnje (A1)	7.058	8.277	12.461	14.400	15.100	18.199	19.500	19.805	21.149	23.000
Celovška road (Lj)	22.000	47.000	56.692	60.000	60.000	58.533	58.968	59.721	60.261	48.000
Ravbarkomanda (A2)	14.884	19.957	21.578	23.658	26.169	28.053	30.758	34.168	37.316	37.528
Trojane (A2)	9.967	13.379	15.030	16.100	17.204	19.779	22.585	28.312	31.347	35.600

Note: * Border Crossing with Austria.

Source: DRSC archive.

Table 43: Traffic increase index 2009/1992.

	index 2009/1992
BC Karavanke	285
Radovljica	224*
Trebnje	326
Celovška road (Lj)	218
Ravbarkomanda	252
Trojane	357

Note: index 2008/1992.

Table 44: Annual average daily traffic on sections of the Ljubljana Bypass between 2000 – 2008.

Method of privatization	2000	2002	2004	2006	2008
East Bypass	28.086	42.772	49.190	55.111	60.026
South Bypass	34.254	45.230	49.920	53.961	59.992
West Bypass	64.102	62.114	65.452	68.500	67.568
North Bypass	54.330	53.182	56.398	59.468	61.274

Source: Prometne obremenitve 2000 – 2008, 2010.

Table 42 indicates a great increase in traffic from the years right after the emancipation of Slovenia to 2009 on all of the sections. The main transport axes, A1 (Dolga vas – Koper) and A2 (BC Obrežje – BC Karavanke), which cross the Ljubljana bypass, have an important effect on the traffic around Ljubljana. The increase in traffic implies a general increase of motorization in Slovenia, as well as the growing importance of the main transport axes in Slovenia, mostly roads A1 and A2, as transit roads. Table 43 indicates a relative increase in the period mentioned. On most of the sections the increase is between 200 to 300 percent.

Figure 54:

Ljubljana bypass is also crossroad of main Slovenian highways A1 and A2; many times it is overloaded with traffic, so congestions occur daily.

Photo: M. Ogrin.



The trend of increasing traffic can be noticed in Ljubljana too, which has a few special characteristics when it comes to traffic. Ljubljana is not only the largest city in Slovenia but also its financial, administrative, economic and demographic centre. This means that numerous traffic flows cross, join and emerge here as well. Table 44 indicates the increase of traffic on the Ljubljana Bypass from the time it was built. On the Ljubljana West Bypass the increase was low, only 5 %; on the Ljubljana North Bypass the traffic increased by 13 %; on the Ljubljana South by 175 %; and on the Ljubljana East by as much as 214 %. The annual daily traffic on all of the sections were already very similar and in the range of between approximately 60.000 and 68.000 vehicles.

Ljubljana's population has been declining over the past few years, but only because its residents are moving to the periphery, often situated already outside of the Urban Municipality of Ljubljana (UML) area. Nevertheless, all of the stated factors have a great impact on the city's traffic. If we consider the unsuitable public transportation system of the city and very bad inter-urban traffic system, it is understandable that a passenger car is the most widely used means of transport. In Ljubljana, which is the largest employment centre in the country, there are more than 170.000 workplaces with 47.000 students, 79 % of whom come from other municipalities (Bajt, 2006). The number of cars in Ljubljana has been increasing throughout the whole post-war period. The number of motor vehicles increased from 135.567 in 1996 (the year when the UML was founded) to 171.516 in 2008 (Statistical Yearbook of Ljubljana, 2009). In 2008, Ljubljana had 276.091 residents and 141.758 registered personal vehicles (Statistical Yearbook of Ljubljana, 2009), which amounts to 513 vehicles per 1000 residents or 1.9 residents per vehicle. Despite the slight decline in the population, we can see an increase in daily kilometres driven, car ownership and daily migration (Plut, 2007).

In UML 65 % of all the trips are done by car. Among the trips between the city and the urban region this share increases up to 90 %. Inside UML the picture of daily trips is a bit different, since 55 % of them are done by car. Walking takes second place with 19 %, after which comes public transportation (14 %), while 10 % of the residents use their bicycles for internal migration (Bajt, 2006). Inside UML 1.2 million trips take place daily, 70 % of which are taken by Ljubljana residents and 30 % by the rest. According to different estimations between 90.000 and 120.000 people come to Ljubljana every day, two thirds of them by car (Strategija trajnostnega razvoja ..., 2001; Lej ga, tramvaj..., 2002; Pichler Milanović, 2005).

The infrastructure for stationary traffic is inadequate for such a number of vehicles, since only 13.216 public and private parking facilities are registered in Ljubljana. Under this category come parking spaces on the streets, parking spaces belonging to Slovene Railways, parking spaces managed by the public company Parkirišča, parking spaces in parking garages and private parking facilities (Možina, 2005). If also we take the parking spaces in front of residential areas into consideration, we can see that at the end of the nineties the total number of parking spaces in UML was 28.000 (Prostorski plan UML – Plan ..., 2000).

Most of the daily commuters who come to the city by car park in unregulated parking facilities, a large number park illegally as well. Ljubljana Public Transport (LPP), which operates on 23 lines, has experienced some changes in the past few years. It has started to adapt to the needs of the residents, which is the first major step forward in the field of public transport in Ljubljana. The access to LPP bus stops has been good for years. 94 % of residents live within 500 m of the nearest bus stop, although there are still some uncovered areas such as Kozarje, Glince and Zgornji Kašelj (Bajt, 2006). The main problem LPP has is the slow speed of the buses, which at only 17 km/h is 10 km/h lower than the average speed of private vehicles, even in peak hours (Bajt, 2006). A positive change which occurred in 2008 was a trial extension of the network to Brezovica and Barje.

During 2009 parking fees in UML varied according to the position of the parking space in relation to the city centre. On the periphery, in parking facilities P+R, the fee was only €1 per day. In the city centre one hour's short-term parking cost €0.6, whereas in garages in the city centre the fees were higher, costing up to €1.5 to €2 per hour. An electronic card called Urbana is used to pay for bus rides. One ride costs €0.8 and lasts for 90 minutes, during which time the passenger can change to an optional number of buses. After that he needs to pay an additional €0.8. A comparison of prices between a visit to the city by car and by LPP still favours the car, which hinders the progress of LPP in Ljubljana. The number of passengers who use the LPP has been declining for the past two decades, although in recent years the decline has been less strong. In 2003, 94 million passengers used the public transportation system, while in 2008 only 84 million did so (Predstavitev ...2010).

For the urban region of Ljubljana, which includes several municipalities around UML, it could be said that railway passenger transport does not even nearly meet the needs of the residents. Railway traffic is developed in the directions towards the cities of Kamnik, Litija, Grosuplje, Logatec and Kranj. Dispersed settlement, which is becoming more and more frequent with the construction of new residential neighbourhoods and shopping centres on the periphery of Ljubljana is contributing to the increased use of passenger cars. This is one of the reasons for frequent congestions in Ljubljana and the traffic is in accordance with this.

It is evident that there are local, regional and European traffic flows in Ljubljana, and this can cause major congestion and traffic jams when peak hours coincide. The new Šentvid Tunnel has probably managed to reduce traffic for a few years since it was opened in the second half of 2008, but in the long run traffic will probably increase because of it.

Table 45: Annual average daily traffic in March 2009 on selected roads in Ljubljana.

Celovška road Mercator	44.900
Celovška road Tivoli	40.760
Dolenjska road (London)	21.078
Drenikova road (podvoz)	31.078
Dunajska road podvoz	41.898
Dunajska road (bridge across the Sava river)	19.774
Erjavčeva road	10.121
Poljanska road	6.119
Slovenska road (Drama)	19.117
Slovenska road (Nebotičnik)	26.320
Šmartinska road	31.862
Tivolska road (Tobačna factory)	32.318
Tržaška road (Vič)	35.310

Source: UML traffic data archive.

Table 46: Change in annual average daily traffic on chosen arteries in Ljubljana.

Section	MDT* 2004	MDT* (March 2009)
Celovška road (Mercator centre)	58.972	44.900
Dunajska road (underpass)	41.275	41.898
Tržaška road (Vič)	32.627	35.310

Note: * mean daily traffic.

Source: UML traffic data archive.

Traffic is high only on the sections of arteries and on connecting roads which connect the arteries (Tivolska road, Drenikova road). Most of the sections of more important roads in Ljubljana have a load of between 10.000 and 30.000 vehicles per day. Low vehicle speed in urban areas is also an important factor, as this contributes to the low traffic flow capacity and pollution of the city atmosphere. So the traffic on city roads with lower travelling speeds cannot be compared with that of regional streets with faster travelling speeds.

Table 47: The proportion of private vehicles, cargo vehicles of all kinds and buses on some of the roads in Ljubljana in 2004.

Section	Percentage of private vehicles	Percentage of cargo vehicles of all kinds and buses
Drenikova road at the underpass	99	1
Slovenska road at Drama	94	6
Tržaška road at Dolgi Most	96	4
Zaloška road at the heating plant	97	3
Celovška road at the underpass at Tivoli	96	4
Šmartinska road at Emona	97	3
Dunajska road, the underpass by Gospodarsko razstavišče	96	4

Note: * mean daily traffic.

Source: UML traffic data archive.

The greater proportion of traffic in the city is composed of private cars, between 94 and 99 %. This is not surprising, since cargo vehicles are usually forbidden from or restricted in cities. Among other categories only public transport has a significant share of vehicles, especially on main Ljubljana roads, such as Celoška, Dunajska and Zaloška roads.

Figure 55:

Slovenska road is still main transport axe in the centre of Ljubljana; railway system in Ljubljana is unexploited and in form as it is today, contributes to road congestions.

Photo: M. Ogrin.



Ljubljana's traffic network has a star-shaped structure, which is formed by the main arteries, surrounded by the city motorway circle. The internal city traffic circle is not yet fully built. The bus routes and bus stops network are incorporated into this structure very well, and are highly adequate for the city area in terms of space, as there are not a lot of areas with bad access to bus stops. This is the case only with recently built neighbourhoods, for which it cannot be said they took access to public transportation into consideration (for example the neighbourhood in Mostec). The same applies to the larger shopping centres (such as BTC or the Rudnik shopping centre) and the Stožice sports centre. Public transportation is adapting to these changes slowly and only in some cases, additionally strengthening the already strong dependence on passenger cars.

The star-shaped structure, in which some of the arteries lead straight into the inner city, causes great congestion in peak hours, which are a very common occurrence in Ljubljana. As a lot of the traffic is oriented towards the city centre, this makes slow moving and stationary traffic one of the main problems of traffic in Ljubljana. The parking policy still promotes parking in the city centre. This is evident in the low prices of the existing parking places and the fact that there are quite a few parking garages in the city centre. As if that were not enough the city authorities are building a new parking garage in the centre and another one is planned. The possibility of parking in the centre still stimulates driving into the inner part of Ljubljana and that causes daily heavy traffic loads on the arteries, which at peak hours already exceed the road capacities. Most of the passenger car traffic heading into the city centre should be stopped on the periphery and redirected to public transport. In this way the overloaded roads would be less busy; at the same time the negative effect of traffic on the environment would be reduced and the numerous parking facilities in the centre would gain different character. Traffic flows from other regions into Ljubljana should be stopped sooner and people should have quick and easy access to the city centre by public transport.

Although UML is introducing the first changes to public transport in decades, it should be more flexible. At the moment, buses still cannot take cyclists, and there are no parking spaces for bicycles at bus stops. On some lines the frequency of the service is still too low and the prices are not competitive. Yellow lanes are considerably too short and more and more empty buses stand in traffic between passenger cars with one or two passengers. For several years a uniform ticket for all Slovenian public transport has been discussed but it has not been introduced yet. In numerous settlements on the periphery, the basic infrastructure for walkers and cyclists such as the pavement or a part of the road reserved for bicycles or even a bicycle lane is still missing. Although pavements and bicycle lanes are being built more frequently, they are still too rare, while lack of connectedness remains a big problem.

Bicycle traffic is growing fast in Ljubljana and exceeds the capacities of the infrastructure, but the impossible circumstances of motorized urban traffic have caused the number of cyclists on the streets of Ljubljana to be much higher than it was a decade or two ago. This is why a lot of the residents of Ljubljana are encouraging the authorities to create a good and safe network for bicycle transport. In 2010 Ljubljana implemented a bicyclist strategy, which should be the foundation for the development of Ljubljana as a bicycle-friendly city.

Fast motorization in Ljubljana brought predominance of a car on roads and parking lots. Public road transport has only a minor role at intra urban mobility and even smaller role at mobility between Ljubljana and the suburbs. State railway system is old and incapable to take an important part of migrations from cities around Ljubljana to Ljubljana. To achieve better intra urban mobility, many citizens of Ljubljana started to cycle daily to school or work due to problems with road transport in the city, however cycling infrastructure is developing far too slow to fulfil the cyclers needs.

With regard to the trend of increasing settlement on the periphery, we can expect that public transport in the city will continue to lose its meaning if it is not thoroughly reformed. The existing situation leads to continuing traffic jams and the predomination of passenger cars. Inevitably, this has a major negative effect on the environment, especially the use of space, noise, air pollution and energy consumption. Because of traffic pollution the quality of air in Ljubljana is becoming a serious problem, since particle pollution in the city as well as nitrogen dioxide and ozone pollution in some parts already exceed legal boundaries.

I 5. Transport infrastructure as development factor of Belgrade

Bogdan Lukić, Velimir Šećerov

Development of Belgrade has been directly caused by the development of transport systems. Demographic, economic and spatial expansion of the city is connected with the development of forms and systems of transport infrastructure. The periods of the development of the city are connected with historical events, but the formation of Belgrade, from the border settlement to the Balkan metropolis, reached its development culmination by the end of the Second World War in the Socialist Federal Republic of Yugoslavia. The progress of transport and all other structures was recorded up to 1980. In that historical year, the stagnation in the development of Belgrade and whole Serbia had begun. The culmination was reached in the 1990s with all retrograde processes, followed by economic recession, disappearing of elementary social values and the wars.

Nevertheless, during “golden seventies” of the 20th century, Belgrade succeeded to improve and develop transport function and transport infrastructure. Perhaps it was the consequence of the tradition of the development of the city in the period of the Kingdom of Yugoslavia, with the two following illustrative examples:

- “Flying Belgrade citizen”, express train, functioning from 1936 as express steam train on route from Belgrade to Zagreb, when the travel took less than 5 hours and
- the first night commercial flight from Belgrade to Bucharest, more precisely, from Pančevo to Bucharest, on September 9th 1923, as a part of the commercial air line Paris-Belgrade (Pančevo)-Bucharest-Istanbul.

Progressive development of transport systems of the 1960s in Europe, the Balkans, the SFRY, Serbia and very Belgrade, enabled the city to valorise the following:

- intercontinental patterns, i.e. telecommunication systems and “Nikola Tesla” airport;
- continental-intercontinental pattern, “Belgrade” port as the largest port in Serbia, on European traffic corridor 7, connecting Belgrade with the network of internal navigable ways of Europe and world sea and
- continental pattern, on the European Corridor 10, connecting the city with road and railroad network of Europe.

Belgrade has still not used the mentioned patterns, because the development of transport and transport systems was slowed down by retrograde processes. Nevertheless, the city with almost two million people, cultural, scientific, educational, economic and natural contents on one side and road, railroad, air, water and telecommunication transport infrastructure on the other side, represents the significant development potential, more exactly “motor” of the development of Serbia and its communication with broader regions.

15.1. Situation and development problems

The situation of transportation systems of Belgrade can be illustrated through several forms of dominant transportation services⁶⁷:

- in 1990, 819.324.000 passengers were transported by public city and commuter transportation, while the figure decreased on 532.186.000 passengers in 2005;
- in 1990, there were 503 lines of public city transportation, while 475 lines were in 2005;
- the length of all lines was 15.423 km (in 1990) and 9081 km (in 2005), with 1864 (in 1990) and 1587 vehicles of public city transportation;
- suburban railway, which has functioned since 2002, transported 6.963.000 passengers in 2005 with 6 lines in a total length of 602 km;
- in public road transport, 6.862.000 passengers (in 1990), i.e. 6.138.000 passengers and 6.187.000 tons (in 1990) and 823.000 tons of goods (in 2005) were transported;
- in air transport, 4.497.000 passengers (in 1990) and 1.122.000 (in 2005) passengers were transported, while the transported cargo was 37.142 tons and 4995 tons;
- etc.

The positive and negative development trends can be explained by a detailed analysis, but the following can also be concluded on the basis of previous data:

- considerable varying within transport services;
- declining trend of transportation of passengers and goods in all segments and
- reduction of transport means by which the service is maintained.

The reasons for the situation are many, but they can be classified into two most significant ones. The first reason is the fifteen-years of intensive crisis Serbia went through and unfortunately, it is still going through. The second one is the rationalisation of transport systems with a series of unresolved issues such as: completion and competitiveness of the transport forms, unfinished major facilities and networks, unfinished transformation of road, and especially railroad system, incomplete facilities and lines, etc.

Development plans from the period of the SFR Yugoslavia represented a special problem, where Belgrade was dimensioned as the capital of the large Balkan state and the focal point of communication of the former non-aligned nations, i.e. "the third world countries". Belgrade has never reached the overambitious development plans, but it has begun with the construction of the major infrastructure on those bases. The construction of Belgrade railroad hub has begun, as well as a part of the by-pass (highway) Batajnica-Bubanj potok, freight terminals, etc.

The role of Belgrade in broader area can be connected with mentioned continental and intercontinental patterns, but after a very unfavourable period of development, the role of the city was reduced on the territory of Serbia mainly, while its daily functional zone, on its administrative area, Pančevo, Smederevo and partly the Srem settlements towards

⁶⁷ Statistical yearbook of Belgrade 2005, Institute for informatics and statistics, Belgrade, 2006.

Novi Sad to India. That issue was the point of discussion during the making of the Regional Spatial Plan of Administrative Area of the City of Belgrade and a series of expert discussions. The functional shadow in cultural, educational, administrative sense has covered Serbia, having partly the broader influence. Nevertheless, daily movements and connections, except mentioned ones, can mainly be connected with suburban railroad lines ("Beovoz").

Transport and transport infrastructure represent simultaneously the key problem and the basic potential of the future development, i.e. one of the most influential factors for achieving the general goal of the conception of protection, organisation and development of Belgrade and its functional area.

The basic characteristics of the existing transport infrastructure of the international and national significance are the following⁶⁸:

- roads of international significance have only partly constructed elements of highway and mainly unsatisfactory roadways;
- the international road network is on the lowest organisation and technical-technological level (traffic and tourist signalisation, motels, services, petrol stations, support service, information, etc.);
- the railroad lines are of one track mainly, having old technical elements and signal-safety equipment;
- geographical position that "Belgrade" airport has, is used insufficiently, the contents and capacities of the airport satisfy the needs of the present international air transport of passengers, but adequate contents and capacities for cargo planes are missing;
- port capacities have not been completely or at all equipped for modern international multimodal transport;
- corresponding coordination of activity between "Belgrade" port and ports in the metropolitan area (Pančevo, Smederevo) is not established; and
- network of logistic centres is undeveloped, terminals of integrated transport are on unsuitable locations and technological equipment is insufficient.

On the regional level, the transport system of Belgrade is characterised by heterogeneous development and technological equipment of all forms of transport and insufficient mutual connection.

The regional and local transport system is characterised by the following⁶⁹:

- the condition of road network does not satisfy in regard of the quality of roads and technical elements of roads;
- all suburban municipal centres are on the main or regional roads on distance from 30 to 60 km, i.e. in isochrones of public transport from 40 to 90 minutes from the centre of Belgrade, however, with inadequate offer concerning the quality of public transportation;

⁶⁸ Regional spatial plan of AA of the City of Belgrade, Belgrade, 2004.

⁶⁹ Regional spatial plan of AA of the City of Belgrade, Belgrade, 2004.

- railroad transport is in bad condition with already mentioned problems;
- technological expiration and insufficient number of trains for suburban and regional transport of passengers; and
- river transport is used exclusively for cargo transport, mainly bulk freight (building material – gravel).

Mentioned problems will limit urban and every other development, they will not enable necessary mobility and needs of sustainable development on the basis of the following facts⁷⁰:

- mono-centric development and high concentration of job positions in the central zone of Belgrade with a tendency to redirect a part of the concentration to New Belgrade and dispersions of the main residential zones in the suburban parts of the city: overemphasized intensity of transport to radial directions and aggravated supply of the central zone;
- inadequately and insufficiently developed network of primary roads which reflects on a very low level of services, especially during rush hours, and especially on bridges and accessible roads and streets;
- partial mixing of local transport with transit and target cargo transport trends in the most critical parts of the primary street system which increases the exploitation costs and the pollution of environment (noise, harmful gas emissions) in some residential parts of the city;
- lack of high-capacity forms of public transportation in the most frequented corridors, so that the level of transport services in the city and commuter transport systems is determined by the dominant form of transport – bus transport, while the commuter rail participates in the overall passenger transport very little;
- chronically insufficient capacity of public and other parking places;
- unresolved issue of the Belgrade railway hub and the tendency to neglect the once main reason for construction of the new hub – removal of railway infrastructure and plants from the Sava river basin: an investment which will ask for considerable funds in the future;
- neglected and marginalized river transport, both passenger and cargo, and unclear position of the passenger river quayside on the Sava, and especially the largest Balkan port on the Danube;
- “Nikola Tesla” airport has lost the priority position it once occupied in the airport network in passenger transport in this part of Europe and its participation in cargo transport is insignificant;
- connection of the administrative area of Belgrade with suburban municipalities relies mainly on road transport, characterized by long travels at relatively short distances, low level of safety and services, poor condition of roads and inappropriate traffic signalisation;
- low accessibility of Belgrade by rail – journeys from other capitals of the Balkans to Belgrade last much longer by rail than by road;

⁷⁰ Strategy of development of city of Belgrade, goals of concepts and strategic priorities of sustainable development, 2008.

- absence of the unique long-term transport policy both on the level of the Republic and the city of Belgrade, resulting in undefined transport management, non-harmonised interests, without division of accountability among several entities, undeveloped financing system.

Aforementioned facts show clearly that when international, state, regional and urban transport aspect of the development of Belgrade is coincided, there are always systems that should be the generators of the development: traffic corridors 7 and 10, "Nikola Tesla" airport and "Beograd" port. The largest potential has been the actual problem of the urban sub-wholes, city, administrative area, functional area and broader.

15.2. Possible development concepts – planning visions and dilemmas

The improvement of transport and transport infrastructure and its putting into completely operative logistics of multifunctional development of the city is burdened by the following:

- strategic solutions are corrected and adapted to the necessary activities of planning, projecting and construction of facilities and networks without which the traffic role cannot be raised to the sustainable transport function and continuity;
- concept of strategic planning of development of the city is deserted, while apartments are being built without any insight in other needs of the city and
- construction of transport systems is late due to lack of resources, which makes the actual situation more difficult.

Therefore, the consequences will be visible only after some processes are being ended, whereof the reconstruction is the primary one. More exactly, Belgrade directed a great deal of its activities towards the reconstruction of unsanitary and uncomfortable structures in constructed parts of old urban wholes. The reconstruction is pragmatic and location one. Buildings appear without other urban contents and the new street regulation. Reconstruction and construction, justified developmentally, give a chance to widen the profiles of narrow streets in old parts of the city and thus improve urban and transport productivity, communal comfort and hygiene and exceed the actual conflicts, whereof two of them are dominant: parking problem and the functioning of public city transportation.

In 1985, the Study of Transport System of Belgrade up to 2000 ("BETRAS") was made. Analytical-information preparation, methodological framework and very qualitative solutions represented the basis of the long-term development of transport systems. On the basis of physical, urban and economic conditions, the planning solution was founded which cannot be and does not have to be too much corrected. The network of main roads was given, as well as road corridors, railways and corridors of underground, transport terminals and ports. However, all forthcoming events slowed down the realization, while the concept of the construction of the first line of underground was being transformed into the first line of high-capacity trolley car, the realization of which has remained an open issue.

In order to exceed the existing situation, the city of Belgrade gives the priority to the construction of bridges, bypass highway and main road rings in its new strategic documents, as well as the modernization of the existing systems and improvement of services, so that the conflicts would be diminished: public city transportation-individual automobile transportation, pedestrian traffic-parking, city transport-transit transport, etc.

The basic aim of the development of transport and transport infrastructure is: (a) on international level, valorisation of its suitable geographical position and position in the network of the European corridors, through the maintaining of the effective transport infrastructure and its functional and technological connection with European transport network; (b) on regional level, preventing further ruining of transport foundation and bad conditions of transport of passengers and goods, as well as making the bases for the development of the system in the future.

Development tasks are the following⁷¹:

- define development of transport and transport infrastructure as the priority of economic and social policy of the city of Belgrade;
- realize the balance between external connection of the Belgrade region and internal organising within the territory, as the unique whole in the coordination with the metropolitan surrounding;
- coordination of all forms of transport (road, railroad, river, air), in order to organise the multimodal hub of the European rank with the network of logistic centres;
- firm coordination with projects based on the corridors (7 and 10);
- development of partnership of public and private sector at planning, construction and exploitation of transport networks;
- making effective and comfortable public transport in the urban area of Belgrade, relied on the system of rail transport, as well as improving the commuter public transport services and integrating it with the public transport in other urban centres in the administrative area of Belgrade;
- rehabilitation, revitalization and reconstruction of transport networks and facilities;
- standardisation and modernisation of technical elements, signalization and transport regime;
- defining policy and support to the development of transport as economic branch; and
- continuation of the construction of Belgrade railroad hub etc.

Concrete engineering activities are the following⁷²:

a) Road network:

- construction of the second road line of E-75 highway Belgrade - Novi Sad – Subotica - Hungarian border (corridor X-b);

⁷¹ Strategy of development of city of Belgrade, goals of concepts and strategic priorities of sustainable development, 2008.

⁷² Strategy of development of city of Belgrade, goals of concepts and strategic priorities of sustainable development, 2008.

- reconstruction of existing road line of E-75 highway (section Belgrade - Novi Sad);
- partial reconstruction of E-75 highway in direction Šid – Ruma - Belgrade (corridor X);
- partial reconstruction of E-75 highway in direction Belgrade – Niš - Thessalonica (corridor X);
- rehabilitation and continuation of reconstruction of bypass Batajnica – Dobanovci – Ostružnica – Železnik - Beli Potok - Bujanj Potok, with preparation of corridor Bujanj Potok – Leštane – Vinča - bridge on the Danube - connection with E-70 (Belgrade - Pančevo);
- development of general project for Highway E-763 (Belgrade-South Adriatic), with possibility of partial realization of some sections significant for the Republic of Serbia. As with the projection on the left bank of the Sava River, the line will be coordinated with the demands of the protection of the "Zidine" source;
- development of corresponding technical and planning documentation for northern main road ring T-6 with bridges over the Danube in zone of upper Zemun and Ada Huja.

b) Railroad lines:

- construction of two-track railroad line E-85 in direction Belgrade - Novi sad – border with Hungary, along with modernisation and construction with elements of line for speeds of 250 km/h and equipment of 160 km/h;
- modernisation of the second track on railroad line E-70, in direction border of Croatia-Belgrade for speeds of 160 km/h;
- modernisation of existing two-track railroad line Belgrade - Niš (E-70) for speeds from 120 - 140 km/h and construction of existing one-track railroad line as two-track with elements of line for speeds of 250 km/h and equipment of 160 km/h;
- rehabilitation and reconstruction of existing one-track railroad lines Batajnica – Ostružnica - Belgrade marshalling – Jajinci - Beli Potok, and construction of the second track in the II stage;
- railroad line Bela Reka - Ripanj (Klenje - Mala Ivanča) as connection between lines of Belgrade - Bar, Belgrade - Mladenovac and Belgrade – Jajinci - Mala Krsna;
- making planning investment and technical documentation for construction of railroad lines: technical - passenger station Zemun – "Beograd" airport; one-track railroad line Vreoci - Obrenovac (with existing industrial railroad line) with possibility of crossing the Sava River (in corridor of highway South Adriatic) and joining planned corridors towards "Beograd" airport and Zemun; Mladenovac – Arandjelovac - Vreoci, with a branch Arandjelovac – Topola - Gornji Milanovac - Čačak.

c) Freight-transport centres:

- development of "Belgrade" port as the place of direct section of corridors VII and X (with limited spatial possibilities), in coordination with the "Danube" port at Pančevo and "Smederevo" port, as the unique system of integrated transport;
- development of logistic freight-transport centres (FTC), in coordination with municipalities in direct and broader surrounding, on the following locations: Pančevo, Smederevo, Novi Sad and Šabac. In the AA of Belgrade, development of logistic FTC of international significance on locations: Dobanovci, "Belgrade" port and Vrčin.

d) Air transport:

- construction of the second airport runway of "Belgrade" airport, development of operative and attached contents, as well as possible construction of cargo terminals of international character;

e) Bicycle transport:

- according to project of European Union on establishing the European network of bicycle paths, two bicycle paths were planned to pass through Serbia that would be mutually connected in the area of Belgrade. The planned corridors as the part of European bicycle network are the following: on the territory of Banat, along the Zrenjanin road, on the territory of Srem, along the bank of the Danube to the confluence of the Sava and the Danube, while on the territory of Šumadija, area along the Smederevo road and along the old Avala road. The location of lines and other technical elements will be explained and defined by corresponding planning and technical documentation.

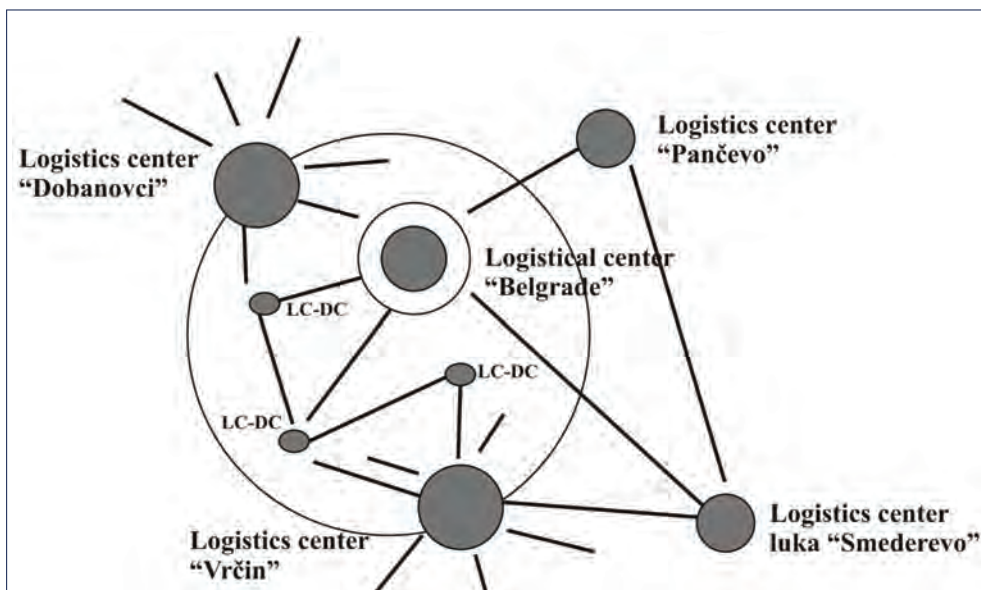
Development of transport system within the functional area of the city will be accomplished through the following:

- reconstruction, revitalization and partly new construction of network of roads on the territory of the AA of Belgrade, along with the introduction of adequate system of maintenance;
- widening the local road network in the function of increasing the accessibility within municipalities, i.e. better mutual connection of settlements and with centres of communities of settlements and/or centres of municipalities (200 - 250 km of new roads);
- reconstruction, modernisation and construction of local and regional road network for better connection of settlements with railroad stations and introduction the so-called electrical bus system of public transport; and
- construction of regional FTC on suitable locations such as Rajča, Umčari, Mali Požarevac, etc.
- transport in conditions of very small visibility and winter exploitation; and
- acquiring the status of the III category airport (SAT III b).

15.3. Development concept of transport and communications

The concept of development of transport and communications is a synthesis of ideas from the previously launched projects, which are an inherited obligation as well as ideas accompanying the goals and vision of the Strategy. Transport and communications represent a part of the system of the city of Belgrade as the metropolitan on the junction of two European corridors (X and XII), as well as the E-70 roads and the future highway towards the south Adriatic, with a developed transport infrastructure and four types of transport: road, rail, air and river, as well as developed telecommunication system, which represents the ideal conditions for achieving an integrated transport system and functioning of the city of Belgrade as a multimodal hub with centralised decentralised concept of logistic centres of Belgrade.

Figure 56: Concept of logistic centres of Belgrade; logistic centre-distribution centre (LC-DC) - Ada Huja, highway and Batajnica.



The concept is the result of planned solutions from the Regional Spatial Plan of Administrative Area of Belgrade, based on the following:

- development of transport and transport infrastructure as a priority in economic and social development;
- balance between external connections of the City and internal organisation;
- harmonising and balancing all forms of transport;
- implementation of projects which emphasise the role of the two corridors;

- development of public and private partnerships in planning, construction and exploitation of transport networks and facilities;
- development of an effective and comfortable public transport system;
- rehabilitation and reconstruction of the local transport network;
- standardisation and modernisation of technical systems;
- support to development of transport economy.

The concept of development of transport and communications will call for systematic horizontal coordination of the public sector as well as with neighbouring municipalities, as well as vertical coordination with the Republic, adjacent countries and European Union, and will be adapted to the possibilities and needs of the city of Belgrade and supported by a new system of long-term planning and programming.

The strategic concept is to enable development of transport economy as one of the most promising branches of economy of the city of Belgrade, followed by development of tourism, recreation and other branches of economy, as well as urban comfort and hygiene increase.

Communications problems became complicated in the very city, so that it was tried to make the concepts of the future road, railroad, air and river transport through planning solutions in the General Plan of Belgrade 2021. The emphasis has been put to the public city transport, parking, pedestrian and bicycle communications, while the development concepts were taken and modified from the previous strategic plans.

15.4. Conclusion and recommendations

Increasing the level of accessibility of the city of Belgrade as the major urban centre will call for considerable activities in the area of transport, investments in all transport sub-systems to increase their efficiency, comfort and safety. This will call for much organised horizontal and vertical coordination of all stakeholders to direct the Belgrade transport to the basic strategic goal: the increase of transport productivity, comfort, safety and hygiene that will enable rational (necessary) population mobility, improve urban comfort, support further development of the city and its participation in the region as well as in the territory of Southeast Europe.

It is realistic to expect that Belgrade will be significant freight multimodal centre in the part of Southeast Europe which can be achieved through the following:

- outer main road tangent (OMRT) – connections of Corridor X via the Lasta hub on the Highway with Pančevo road, including the new bridge on the Danube (Ada Huja);
- completion of OMRT in the Lasta – Avala road part of the hub;
- completion of the by-pass in the part Batajnica – Bubanj potok (stage 1) and Bubanj potok – Pančevo road with a new bridge near Vinča (stage 2);

- construction of a cargo terminal at Nikola Tesla airport and construction of a railway connection (passenger and cargo) with Belgrade;
- coordinated development of multimodal centres in the area from the port of Šabac on the Sava to the port of Smederevo on the Danube. In this sense, it is planned to construct a new harbour on the left bank of the Danube. It was not planned, but it was imposed by political financial-arrogant powerful persons to build a new port on the left bank of the Danube and to develop commercial activities on Ada Huja, as well as to construct new railway connection with the left bank on the Danube (the new port on the Danube); Unfortunately, Belgrade (and Serbia) does not have morally valuable managing infrastructure for almost 30 years so that the sale of capital public values (building land, technical infrastructure and facilities, public services) has been actual. Whether the citizens of Belgrade and whole Serbia need to build new port on the Danube only because one marginal and powerful group will be richer, and the city of Belgrade poorer, has remained an open question without answer.

The concentration of population, activities, attractive contents and events give chance to the city of Belgrade to be improved as the multimodal hub through the following:

- improved quality of the roads linking Belgrade with suburban and inner functional zone;
- development of an integrated transport management system;
- reconstruction of a part of Ibarska road from Banovo brdo to the hub with the bypass;
- connecting Batajnica road and the new Novi Sad road via Zmaj loop with the New Belgrade blocks (T6);
- construction of the inner main road semi-ring (IMRS);
- reconstruction and construction of new bridges on the Sava river and the Danube;
- regulated entrance to the central zone of the city;
- construction of tunnels to connect certain parts of the primary network;
- construction of a network of new bus stations;
- completion of the passenger railway hub;
- construction of the second airport runway and modernisation of "Nikola Tesla" airport;
- modernisation and technological improvement of transport.

Negative ecological impacts of all forms of transport have often been emphasized; however, generally, transport is primarily very positive activity, with a series of improvements of ecological values of the city which can be recognized in Belgrade as the following:

- construction of the first line of the high-capacity public transport system in Belgrade;
- stimulating the use of "Beovoz" in commuter transport;
- reorganisation of public city transport in the Beovoz corridors as well as within the whole network;
- introduction of river passenger transport;
- increased level of transport safety;
- development of new multimedia technologies, i.e. services;
- development of bicycle transport;
- stimulating pedestrian commuting;
- modernisation of the city streets in all urban centres in accordance with transport demands and standards;
- modernisation of local roads.

Belgrade represents the primary focal point of the development of tourism in Serbia which can be achieved through the following:

- construction of a marina for recreational transport on the Danube and the Sava;
- activating Batajnica airport for low-cost airline companies;
- creating conditions for obtaining category 3 for "Nikola Tesla" airport;
- completion of primary contents at the Sava passenger port;
- standardisation of tourist services in transport;
- development and reconstruction of the regional network at the broader territory of the city of Belgrade;
- construction of heliports in suitable locations.

The basic privileges for development of transport and transport system of the city of Belgrade are the following:

- position on intersection of two European corridors (7 and 10, with a branch 10b);
- position and construction of network of roads, railroad tracks, ports and airports; provided corridors and areas for development of integrated transport system; and
- interactive impact of economic potential of AA of Belgrade on development of transport as economic branch of the priority significance.

By reconstruction and construction of Belgrade passenger railroad hub, the effect of the key factor of metropolization is the introduction of city-commuter railway. This will be accomplished by its direct introduction into the most attractive parts of the metropolitan core.

The development patterns of the Danube and the Sava have double significance by connecting with the settlements of Pančevo, Smederevo, Novi Sad, Obrenovac, Šabac and other settlements.

In the conditions of expected economic growth, increased employment rate, exchange with neighbouring countries, attractiveness for commuters, tourists, activation of foreign companies' operations, etc., the existing transport system of the city of Belgrade will not be able to provide an appropriate level of services, especially in very Belgrade, as the primary economic and business centre.

Transport infrastructure of the city of Belgrade has marked characteristics which determine the level of its accessibility, which will have impact both on its future competitiveness within Serbia and Europe. Nevertheless, due to complexity of the territory, it will play significant role within the borders of the administrative area, in all 18 municipalities.

Transport, transport infrastructure and transport economy are capital development factors of the city of Belgrade, the potential which will always be emphasized. This relates to inter-regional processes (making connections with the environment) in which the city of Belgrade was not very significant, as well as to permanent intra-regional role (within the regions) of the connection of activities and structures.

I 6. Spatial-functional transformation of the metropolitan area of Ljubljana

Dejan Rebernik

In this chapter we provide an overview of the current state, trends, and major processes in the spatial and functional development and transformation of Ljubljana over the last ten years. The analysis of spatial development and transformation of the city is divided into five sections:

- internal development of the city,
- derelict urban areas,
- areas of dispersed urbanization,
- functional transformation and rational use of land and
- housing.

For each section an analysis of the current state, trends, and latest processes is presented. The processes of spatial and functional transformation are evaluated from the standpoint of sustainable spatial development as well.

I 6.1. Internal development of the city

Spatial development of settlements in Slovenia has for the most part been extensive, with villages and towns expanding mainly into previously unbuilt upon surrounding areas, most often in the form of dispersed settlement. This is true also of the Ljubljana urban region. Nevertheless, after 1995, with the upswing in private housing construction and the development of business, retail, and service activities, there has been a noticeable increase in the use of available land within Ljubljana. Private capital and its investments became a major actor in the transformation of the city and its built structures. In Ljubljana private capital has been invested intensively in housing construction, retail and service centers, and business zones. In this respect two patterns have been established in the spatial development of Ljubljana. On the one hand, the expansion, both planned and unplanned, of urbanized areas in the suburban and rural parts of the urban region has continued, particularly in the form of dispersed construction of single-family houses, groups of multi-family dwellings, shopping centers, and economic development zones. On the other hand, there has been a strengthening of the “internal or infill development of the city” in the form of construction and increasing density of urban structures within the compact urban area, and especially at the edge of the city center and in existing housing, business-industrial, and retail and service zones and in degraded urban zones. Most frequently infill development is characterized by individual multi-dwelling buildings and less frequently also smaller residential neighborhoods and areas intended for businesses and services are developed. In this way there is an increase in the density of urban

structures and in the use of unused or underused areas within the city, which is one of the fundamental guidelines directing the spatial development of cities in the strategic documents of Slovenian spatial development; however, this “internal development” is left in its entirety to private initiative, which is frequently reflected in inappropriate, poorly adapted and uncoordinated interventions in the space which reduces the overall quality of the living environment, and cause new traffic flows and the additional degradation of urban areas. Redevelopment of derelict urban areas and vacant land within the city takes place for the most part in the form of isolated buildings, most often in the form of individual multi-dwelling buildings (“villa blocks of apartments”). Construction is often done in a way which is not in accordance with the morphological characteristics of areas (for example the construction of two- and three-storey apartment buildings in areas of single-family dwellings). The utilization of the plot of land is often excessive, which reduces the quality of the living environment or puts too heavy a load on the traffic network in a particular part of the city. In this connection we note a lack of appropriate urban norms and values in spatial planning legislation and other documents.

16.2. Derelict urban areas

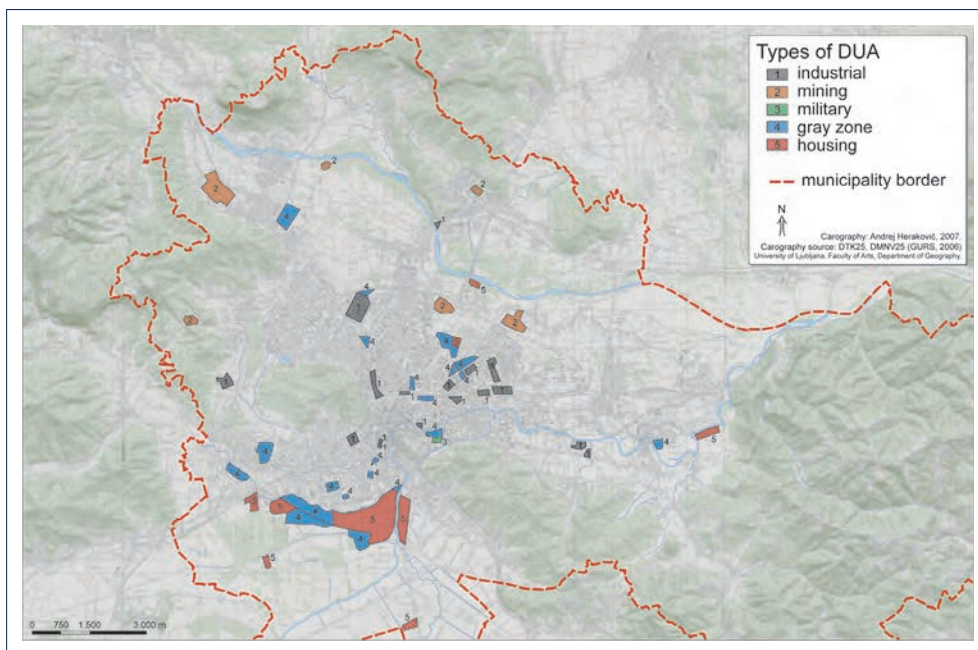
“Derelict urban areas” are a kind of byproduct of processes associated with the economic, functional, social, and spatial transformation of cities. Derelict urban areas are thus a “temporary” state accompanying the transformation of any urban system. Degradation or devaluation of the urban area is a process of reducing the value of plots of land, buildings and installations there from a higher to a lower state of utility. This leads to the less adequate use of an urban area or a complete abandonment of use. An extreme degree of devaluation is a state in which it is no longer possible to establish any renewed use of a given location without a total reclamation or reconstruction of the area. We can also refer to the degradation of an urban area when the existing use is not in keeping with the expected or optimal use—the assessment of degradation thus arises from the assessment of the unutilized development potential or the comparative advantages of a given area. Koželj cites an average of 15 % of the area of Slovenian cities as being degraded areas (Koželj, 1998).

Derelict urban areas in Slovenian cities are primarily the result of their constant economic, social, traffic, and spatial transformation. In Ljubljana the extent of derelict areas in the form of abandoned industrial areas has especially increased due to the process of deindustrialization and the relocation of older industries to industrial areas at the edge of the city. Derelict urban areas in Ljubljana are also partly the result of the abandonment of some other activities (for example military installations, gravel pits) or are the result of inadequate spatial planning (the designated use of land is not in keeping with the needs and interests of investors), land speculation, or unclear ownership relations (due in particular to incomplete denationalization procedures). The following types of derelict urban areas, as defined by Koželj (Koželj, 1998, 29), are especially typical of Ljubljana:

- industrial areas: abandoned or unsuitably located industrial and other manufacturing areas or premises, warehousing areas, gravel pits and areas in the environs of the railway;
- military areas: abandoned military barracks;

- gray zones: vacant and unbuilt areas or areas with unsuitable use as a consequence of inadequate spatial planning, land speculation, or unclear land ownership relations;
- derelict housing areas: housing areas with a poor quality living environment, equipped with deficient infrastructure, and dispersed construction.

Figure 57: Derelict urban areas in Ljubljana.



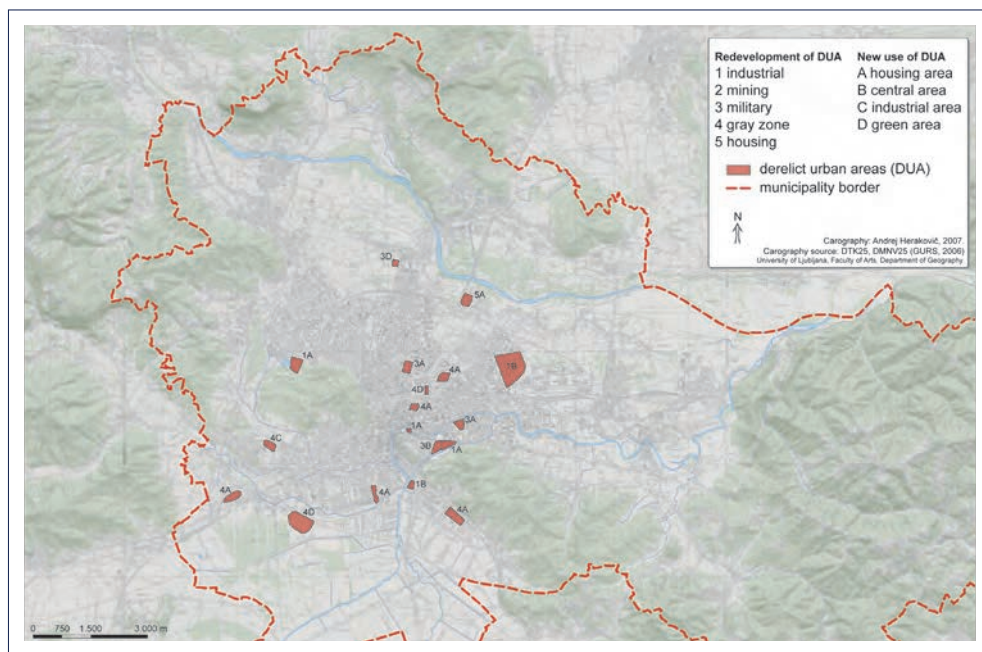
Source: Rebernik, 2007, 27.

In the last ten years there has been intensive reclamation, revitalization, and renewal of derelict urban areas. Most commonly the new spatial organization is undertaken by private investors, but some cases have come about as the result of public investment. The most common forms of renewed use of derelict urban areas are as areas of housing and shopping centers, less frequently also new economic development zones or business activities. In the case of derelict urban lots these are usually contiguous areas and hence larger housing neighborhoods are built in the form of organized housing construction, major shopping centers, or business zones. This is in accordance with most objectives and guidelines of the Spatial Development Strategy of Slovenia (2004). Still needed are coordinated and integrated programs and incentives of redevelopment and revitalization of derelict urban areas (subsidies, tax breaks, land consolidation, pre-emptive purchasing rights, private-public partnership).

In the continuation we cite some of the most extensive and typical cases of the redevelopment of urban areas in Ljubljana:

- derelict industrial areas: the BTC and City Park shopping center, the residential neighborhood of Mostec, the residential neighborhood of the Poljane Embankment (Poljansko nabrežje), the Savski kamen block of apartments, the residential neighborhood of Zelena jama (along Pokopališka Street), and the residential neighborhood of Tivoli;
- derelict military areas: the residential neighborhood of Bežigrajski Dvor, the residential neighborhood of Nove Poljane;
- gray zones: the residential building Trubarjev kvart, the residential-business area of Novi Tabor, the block of apartments on Glonarjeva Street, the block of apartments on Bobenčkova Street, the residential neighborhood of Trnovska vrata, the "villa" block of apartments along Jurčkova Street, the block of apartments along Trnovska Street, the Antonov trg block of apartments (along Tržaška Street), Severni park, the Brdo technological park;
- derelict housing areas: the Tomačevo settlement of row houses.

Figure 58: Redevelopment and new use of derelict urban areas in Ljubljana.



Source: Rebernik, 2007, 29.

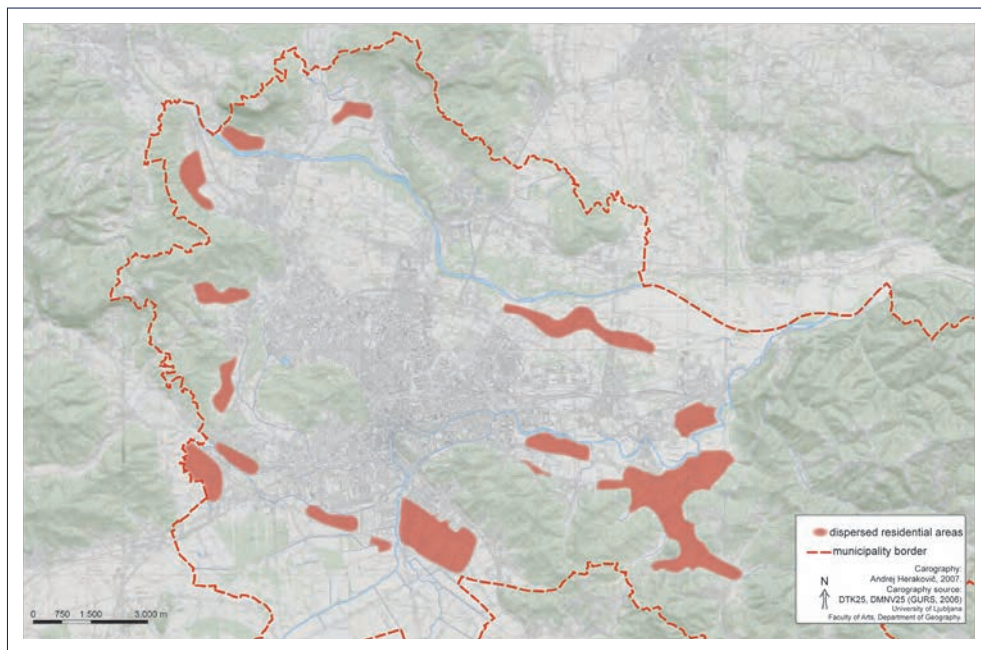
16.3. Areas of dispersed urbanization

Preventing the continuation of dispersed urbanization as well as reclaiming selected areas of dispersed settlement is possible only if there is sufficient supply of land for building within the areas for which urban planning documents (municipal spatial plans) have been prepared, and with the consistent prevention of building on all other plots of land—the prevention of the practice of changing the categories of land use for plots, for example from agricultural to housing, based on the initiatives and interests of local residents and private investors. This would require that local communities actively prepare spatial plans for areas of housing construction (with a suitable type and density of building for the particular type of settlement). This must be accompanied by an active land use policy in the form of measures and instruments for guiding the development of settlements (tax, market, financial, administrative, and regulatory instruments).

Intensive suburbanization also continued to take place in the Ljubljana urban region after 1991. The relocation of population from Ljubljana to suburbanized areas around the city is still intensifying: the population of Ljubljana decreased by 9000 inhabitants, or 3.5 %, between 1991 and 2002. The Urban Municipality of Ljubljana has a negative migration balance, whereas all the other municipalities in the Ljubljana urban region have a positive migration balance. An especially large rate of population growth from migration is shown by the municipalities of Domžale, Grosuplje, Ivančna Gorica, Medvode, Škofljica, Ig, Brezovica and Trzin. After 1995 the greatest growth in population was typically shown by small rural settlements in the Ljubljana urban region. Compared to the period from 1981 to 1991, the area of population growth has expanded spatially from the densely settled suburban areas to the rural areas in the region. New settlement in the countryside is markedly dispersed, frequently outside existing rural settlements or at their edges. The phenomenon is taking on all the characteristics of “urban sprawl.” Pronounced examples of the pattern of settlement described are rural areas in the municipalities of Škofljica, Ig, Brezovica and Vrhnika. It consists of exclusively new construction in the form of single-family houses, most often “individual self-construction.” New buildings are located individually or in small clusters. This kind of settlement is engendered by the scarcity and high prices of housing and building lots in Ljubljana as well as in suburbanized areas.

Areas of dispersed settlement with a low population density, a predominance of stand-alone single-family houses and low density of population are also typical of certain parts within the city of Ljubljana. Frequently these are areas of houses that were built without planning permission and then retroactively legalized, or “urbanized” rural settlements which arose through the gradual transformation of former farming villages in the vicinity of the city. Such areas develop in an unplanned and unregulated way, without a uniform urban planning or morphological design. Typical of them is the intertwining of different forms of land use (one-family dwellings, farmland, small businesses and service activities), extremely poor municipal and other infrastructure (inadequate sewage system, traffic routes, and public spaces), a lack of retail and service activities, and as a rule poor quality construction and a relatively low socioeconomic status of the population. Areas of dispersed construction thus have certain characteristics of derelict housing areas. The largest and most typical areas of dispersed settlement are within the city of Ljubljana, for instance the areas of Sibirija, Rakova Jelša, Ilovica, Galjevica, Dobrunje, Sostro, Zadvor, Spodnji Kašelj, Šmartno, Glince and Kozarje.

Figure 59: Location of low density and dispersed residential areas in Ljubljana.



Source: Rebernik, 2007, 31.

16.4. Functional transformation and rational use of land

In the conditions of a market economy and predominantly private ownership of capital and real estate, the actual use of space is dependent not only on the planned and designated use of space as specified by plan categories (housing, production, retail and services and other areas), but also on the interests of private investors. In the case of private investments a particular intervention in a space is done only if there is a demand by the market for a particular type of land use in a given location. Since it is very difficult to anticipate the needs and interests of investors, which are constantly changing with the development of the city and with respect to market circumstances, a rigid zoning in the form of strict separation of land uses in existing spatial planning documents has led to numerous difficulties in the spatial development of Slovenian cities and other settlements. On the one hand numerous instances arise where in certain locations there is insufficient interest in carrying out some intervention in accordance with the designated and planned use. In this case land remains unutilized. This can serve to deter investors and represents a serious obstacle to the development and competitiveness of particular towns and entire regions. On the other hand there is pressure from investors to change the existing planned use of a particular plot of land, which often leads to the partial changing of spatial documents and to inappropriate and damaging interventions in the space. A new orientation towards a more “flexible” determination of the intended use of land, particularly in the form of “mixed use”, in which an intertwining of functions and forms of land use which do not come into conflict with one another is permitted, and

expected to solve the problems cited. Moreover, this intertwining of functions and shift from a monofunctional zoning has other positive effects, in particular the reduction of the distances between places of residence, work, and shopping, which reduces the volume of traffic.

An analysis of the functional transformation of Ljubljana after 1995 highlights different processes. There have been some significant changes in the functional structure of the city. Among private investors, interest is greatest in housing construction and in some places construction of shopping centers and office buildings. Due to the scarcity of land that can be built on there have been changes in the designated use of particular plots of land, which enable the forms of land use cited. Moreover, over the past two decades there has been an abandonment of certain types of land use, in particular for manufacturing, warehousing, and military purposes. As a result of this process there are derelict or inappropriately utilized urban areas. Depending on the location, the demand among private investors is predominantly for housing construction, partly also for retail and services outlets (shopping centers) and business activities. The planned designated use in these areas often does not allow this kind of land use, and so some changes in the designated use are made. The result of these processes is the increasingly heterogeneous functional structure and mixed use of land in many parts of the city, as noted already in articles by Pak (Pak, 2000, 2002). The next characteristic of the functional transformation of Ljubljana is the creation of large retail and services areas, especially shopping centers at the outskirts of the city. In addition to retail activities, other specific service and business activities are also located in these centers. Due to the development of shopping centers there is often a decline in retail and other services in city center as well as in local retail centers within housing areas. Retail, services, and business activities are located in these new retail-business centers due to numerous advantages and benefits: good access, low cost of land, economies of scale, low overheads and so on. There is thus a spatial concentration and separation of particular urban functions, which is in contradiction with the desired intertwining and mixed use of land. The distances between places of residence, work, and shopping are increasing, and this also has an effect on the volume of traffic. At the same time there are two processes under way in the functional transformation of the city: on the one hand we see an increase in the functional heterogeneity and on the other a spatial concentration of activities.

In this context the question should be raised as to whether an orientation towards a "mixing of activities" and dictation of mixed land use by the plan makes sense or whether it will only bring additional problems. Numerous newly built business and residential buildings, in which business premises frequently remain unsold and unused, draw attention to possible problems and discrepancies between planning guidelines and the interests of the market and investors. Urban planning documents prescribe mixed land use with a combination of retail and business activities, even if there is no demand for business premises in a given location. A further problem with the concept of mixed use is maintaining the quality of the living environment and an intertwining of activities which is not disturbing. The highest quality of living environment is undoubtedly created in "pure" residential areas. Residential neighborhoods offering the highest quality living environment and the most favorable economic status of residents of Ljubljana are "pure" residential neighborhoods. In such residential neighborhoods it is possible to achieve less transit traffic and fewer environmental disturbances (noise, air pollution, etc.), in-

creased safety, higher identification with and care for the living environment on the part of residents, greater tidiness and cleanliness, fewer conflicts between the local population and non-residential activities and their users, and similar.

16.5. Housing

Due to the higher standard of living, changes in the structure of households, and still relatively low area of housing per capita (according to the estimate of the Spatial Plan of the Urban Municipality of Ljubljana 23.5 m²), particularly in certain characteristic parts of the city (residential neighborhoods consisting of blocks of apartments) and among certain characteristic groups of residents (young families) we can expect greater demand for new housing despite a decline in the population of Ljubljana. The average number of persons per apartment in Ljubljana has declined from 3.3 in 1971 to 2.4 in 2002 (Spatial Plan of the Urban Municipality of Ljubljana, 2010). It is estimated that by the year 2015, 15,000 new apartments will be needed in Ljubljana: 4000 due to the depreciation of existing apartments, 4000 due to an increase in the number of households, and 7000 due to a rise in the standard of living (Spatial Plan of the Urban Municipality of Ljubljana, 2010). The most recent trends in housing construction show two spatial patterns: a continuation of individual dispersed construction in settlements at the edge of the city and urbanized rural settlements in the Ljubljana urban region, with low densities and oversized one-family houses, and construction of multi-unit buildings within the city, most often in the form of smaller multi-unit houses ("villa blocks"). Housing construction in Ljubljana has gradually increased over the last ten years. In 1995 there were 282 new apartments built in the territory of the Urban Municipality of Ljubljana (44 % by legal entities), after 2000 the number ranged between 900 and 1300, of which about 75 % were built by legal entities (Statistical Yearbook of Ljubljana, 2006, 96). Due to the lack of larger consolidated building lots, especially characteristic are individual multi-unit dwellings (or small groups of multi-unit dwellings) which are frequently located in neighborhoods of single-family dwellings. This changes the existing morphological structure of housing areas. Due to the economic interest of investors, overuse of the lot is typical, which reduces the quality of the living environment in particular residential neighborhoods. Examples of the organized building of larger and contiguous residential areas with a uniform urban planning and architectural layout are more common after 1995, for example, the neighborhoods of Bežigradski dvor, Nove Poljane, Mostec, Nova Grbina, Dolgi most (Ramovševa Street) and Beli gaj (Kozarje). We also see the organized construction of single-family houses, particularly in the form of dense low-rise construction (row houses or atrium houses), which ensures a high quality environment and the advantages of living in a one-family dwelling, but at the same time has a high population density (between 60 and 100 inhabitants per hectare), for example, the smaller residential neighborhoods in Galjevica, Podutik, Vižmarje, Tomačevo, Snebrje, Črnuška gmajna, Polje, Bizovik and Hrušica. Due to the high quality of residence these row and atrium houses are sold for very high prices and are accessible only to people with above-average incomes. Newer housing construction in Ljubljana can thus be divided into two main groups: unorganized construction in the form of individual buildings or small groups of buildings located in existing residential or mixed-use areas, and organized housing construction in the form of residential neighborhoods following a uniform urban planning and architectural plan.

17. Spatial-functional transformations of the metropolitan area of Belgrade

Branka Tošić, Zora Živanović

Changes in area and spatial-functional structure of the Belgrade settlement and its administrative area as the consequence of the complex developmental processes are intensive particularly in the second half of the 20th century. By the time the size of the territory of the Belgrade settlement increased intensively which also resulted in the corresponding administrative-territorial changes. The urban area of Belgrade expanded permanently, influenced by the influx of population from the interior of Serbia as well as from the former Yugoslav republics. The surrounding rural settlements were gradually disappearing by the expansion of the urban area through the construction of housing zones and blocks, then infrastructural and super structural systems, economic and non-economic facilities. The transformation process of the rural settlements from the agricultural into the urban area resulted in their growing together and joining the Belgrade settlement, i.e. its spatial expansion. The urban expansion was followed by the intensive process of industrialisation and tertiary activities, i.e. the change in the structure of the activities not only of the Belgrade settlement but of all settlements in its considerable functional area.

The Belgrade settlement belonged to its administrative area (City of Belgrade, or Belgrade urban region) which expanded by the middle of the 20th century and was finally constituted in the 1970s. The City of Belgrade received the status of the City of Belgrade by Law of territorial organisation of the Republic of Serbia (2007). The borders of the administrative area did not literally follow the changes of borders of the functional influence of the city.

17.1. Territorial expansion of the Belgrade settlement and its administrative area

Before World War I, in the times of the Kingdom of Serbia, the Belgrade settlement consisted of six areas on the area of 1200 ha. By law of the name and division of the Kingdom of Yugoslavia in 1929, a special capital administrative unity of Belgrade was formed in community with Zemun (urban settlement of Srem) and Pančevo (urban settlement of Banat, at the left bank of the Danube), which was also verified by the Constitution of 1931. The administration of the city of Belgrade included the area of 378 km² with the population of 238,800. The possibilities to unite the three urban settlements of Belgrade, Zemun and Pančevo through the developmental processes and by physical expansion in the conditions of the economic underdevelopment and social lagging did not exist actually. However, their linking into the unique territorial-administrative unit was only partially realised after World War II.

By the formation of the Autonomous Province of Vojvodina, Pančevo separated from the Belgrade area, while the part of Belgrade remained on the Banat side with the Krnjača municipality which later went into the structure of the urban municipality of Palilula. The expansion of Belgrade to the Srem side was achieved by covering the swampy alluvial plateau at the confluence of the Sava and the Danube where the construction of New Belgrade and connection of the urban tissue with Zemun began at the end of the 1940's.

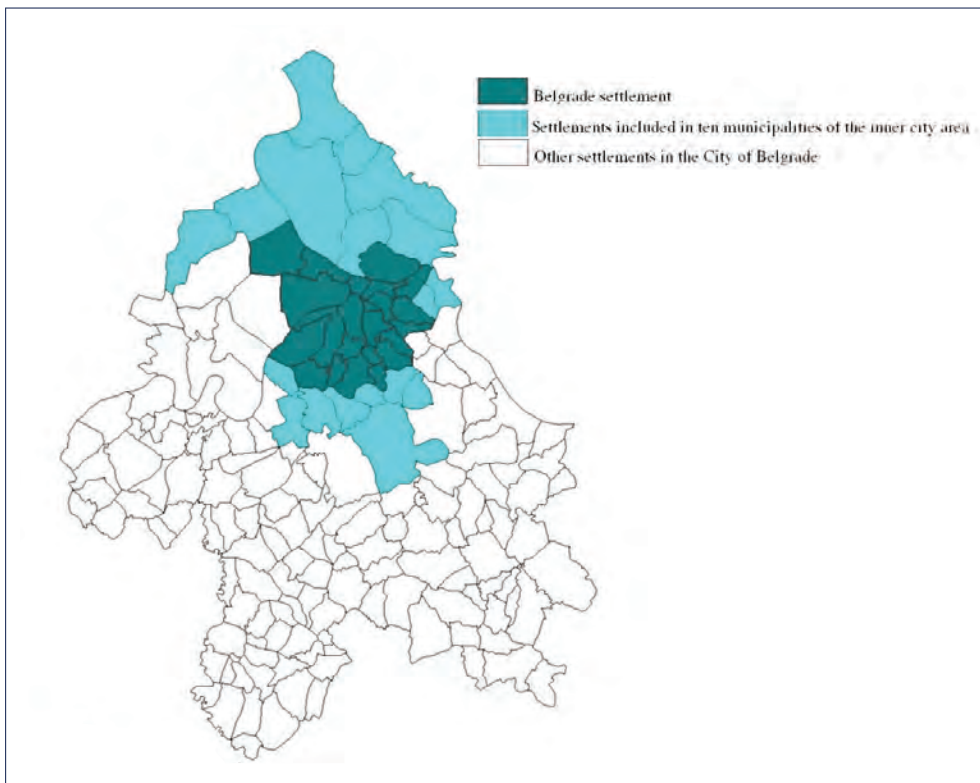
The inner area of the city of Belgrade was defined by Law on areas and administrative districts in the National Republic of Serbia in 1959 and it consisted of 10 municipalities the names of which were later changed insignificantly. The urban whole of the present Belgrade settlement consists of the urban parts of the following municipalities: Voždovac, Vračar, Zvezdara, Zemun, New Belgrade, Palilula, Rakovica, Savski Venac, Stari Grad and Čukarica.

During the second half of the 20th century the Belgrade settlement was expanding to all directions and joined the surrounding rural settlements which gradually merged with the urban tissue. The parts of the city from those areas kept the names of the original settlements (e.g. Kumodraž, Mirijevo, Bežanija, Žarkovo, Rakovica, Kneževac, etc). Consequently, the total area of the present-day Belgrade settlement is 1294 km² and the population number is about 1.120.000.

In the times of the Kingdom of Serbia, the direct encirclement of the Belgrade area had the status of the separate administrative unit, as District of Belgrade. The total area of the district was 2025 km², while the urban agglomeration of Belgrade, located at the border position, had 697.000 inhabitants in 1900. After World War I, by the formation of the Kingdom of the Serbs, Croats and Slavs, and afterwards the Kingdom of Yugoslavia, Belgrade as the capital was free of the border position, acquiring safe encirclement and a chance to develop and expand more equally on both sides of the former border rivers of the Sava and the Danube but not just to the south. By law from 1929, the Belgrade district was formed including 9 administrative districts and 123 municipalities on the total area of 3105 km² and the population of 319.300. This territorial division was the basis for the further expansion and final constitution of Belgrade administrative area.

In the early 1960s, the Belgrade administrative area had the status of the administrative district in a broader sense with 15 municipalities and 119 settlements on the area of 2402 km² and the population of 843.200. The inclusion of the municipalities of Obrenovac, Barajevo, Sopot and Grocka characterised the expansion of the Belgrade administrative area of this period. By the beginning of the seventh decade of the 20th century the administrative Belgrade area was completed by joining the municipalities of Mladenovac and Lazarevac. The last change from 2004 has related to the separation of the settlement of Surčin from the Zemun municipality, so that today the Belgrade administrative area has 17 municipalities (Figure 60). The figures of the last census showed that there were around 1.576.000 inhabitants in 157 settlements on the area of 3222 km².

Figure 60: Administrative division of the City of Belgrade (Belgrade urban region).



17.2. Demo-economic and morphological processes in the area of the Belgrade administrative area

The population increased intensively on the whole administrative area of Belgrade in the period from 1971 to 2002. The increase prevailed in all suburban municipalities, but not in all urban ones. The central urban municipalities had the population decline in the whole period which pointed to the phase of urbanisation characterised by moving out of the city core and the conversion of the housing area into the business (Table 48). The urban municipalities participated with more than 80 % in the total population of the Belgrade administrative area.

Table 48: General data on administrative area of Belgrade with changes (territorial division of 2005).

Municipalities	Area (km ²) 2005.	Number of settlements 2005.	Population number 1971.	Population number 2002.	Index of population growth 2002/71.
Vračar	3	-	134.207	58.386	43,5
Savski Venac	14	-	84.291	42.505	50,4
Stari Grad	7	-	112.938	55.543	49,2
Voždovac	149	4	139.958	151.768	108,4
Zvezdara	32	-	92.200	132.621	143,8
Zemun	150	2	126.380	152.950	121,0
New Belgrade	41	-	50.507	217.773	431,2
Palilula	447	7	63.531	155.902	245,4
Rakovica	30	-	83.742	99.000	118,2
Čukarica	156	7	102.545	168.508	164,3
Urban area	1.029	20	990.299	1.234.956	124,7
Barajevo	213	13	16.552	24.641	148,9
Grocka	289	15	35.275	75.466	213,9
Lazarevac	384	34	45.675	58.511	128,1
Mladenovac	339	22	47.134	52.490	111,4
Obrenovac	410	29	53.260	70.975	133,3
Sopot	271	17	21.166	20.390	96,3
Surčin*	289	7	-	38.695	-
Suburban area	2.195	137	219.062	341.168	155,7
CITY of BELGRADE (AA)	3.224	157	1.209.360	1.576.124	130,3

Source: Municipalities in Serbia, 2003, 2006. Statistical Office of the Republic of Serbia, Belgrade.

Note: * data for the municipality of Surčin for 1971 are included in the municipality of Zemun.

The events of the last decade from the last century, marked by deep social and economic difficulties, as well as by the political disturbances on the area of the former Yugoslavia, strongly influenced the population development of the City of Belgrade. That resulted in lower and lower rate of natural increase, emigration of mainly highly-skilled and young population in foreign countries, or in the phenomenon of refugees' moving from the former Yugoslav republics to Serbia and Belgrade (in the period from 1991 to 1995 about 706.000 of registered, mainly Serbian, population moved to Serbia, while a third of this total number settled the City of Belgrade).

Within the City of Belgrade, except the settlements which make the urban whole (those which are marked as "Belgrade part" in the census) there are settlements, according to the official statistics, which are proclaimed as the urban ones. The change of their total number can be followed through the census years. According to the 1971 census, there were 25 urban settlements, while by the 1981 census the number reduced on only 15 due to joining the urban whole of Belgrade. According to the census of 1991, three more settlements received the urban status, so that there were 18 of them. According to the last census the situation did not change. Above mentioned, the urban settlements are also the centres of all the suburban Belgrade municipalities except Barajevo. The largest urban settlements, not counting the large suburban areas of Belgrade, are the centres of the suburban municipalities-Lazarevac, Obrenovac and Mladenovac with over 23.000 inhabitants⁷³ (Živanović Z., 2006).

In the early 1990's, one third of the total workforce in Serbia was employed in the activities of the City of Belgrade. The strength of this area in a domain of the economy is perhaps best illustrated by the fact that the number of employed in Belgrade was a little higher than the total number of employed in Vojvodina during the ninth decade of the last century (Derić B., Smiljanić Z., 2004). The percentage of employed in the total population of the City of Belgrade (66.1 %) is over the average for Serbia (60.1 %). However, according to the 2002 census, the absolute number of employed on the territory of the City of Belgrade declined for one fourth in relation to the year of 1989, as the last year before the crises which seized Serbia.

There is significant inter-municipal difference in the proportion of employed. In the central urban municipalities of Stari Grad, Vračar and Savski Venac, the number of employed far exceeds the total population which is the confirmation of very strong daily migration of workers. Namely, the characteristic of the inner city centre is the continuous change of the housing area into the business one, the consequence of which is the considerably expressed function of labour in relation to the function of housing.

The inter-municipal differences are also significant in regard to the structure of employed which point to the social and economic, i.e. developmental heterogeneity of the Belgrade area⁷⁴. The domination of tertiary and quaternary activities is extremely expressed in the urban area, with even more than 80 % in the municipalities of the central zone (Živanović Z., 2008).

⁷³ By Regional Spatial Plan of the AA of Belgrade of 2002, the urban settlements of Mladenovac and Lazarevac are defined as sub-regional centres, while the urban settlement of the Obrenovac municipality as developed urban centre.

⁷⁴ In favour of the mentioned is the comparison of the number of employed with the total areas of the municipalities which would point to a great concentration of employment in the municipalities that are small by the area, i.e. small range of employment in the municipalities that include great areas, lower degree of urbanisation.

Table 49: Structure of activities in 2002 in the City of Belgrade.

	Total employed	Primary sector		Secondary sector		Tertiary-quaternary sector	
		number	%	number	%	number	%
City of Belgrade	556.060	27.736	4,99	148.579	26,72	379.745	68,29

Source: The 2002 census.

Considering that the proportion of employment in the tertiary-quaternary sector considerably exceeded the values of the same index for the secondary sector (Table 49), the structure of employment in the economy of Belgrade can be considered as conditionally favourable. Namely, such structure is the index of following the developmental processes in more developed countries, wherein it has come to the sudden increase in the tertiary and quaternary activities by applying the accomplishments of the technological information revolution, by which the end of the domination in industrial mass production was marked. In least developing suburban municipalities, however, the insufficiently diversified economic structure, i.e. underdevelopment of the secondary sector of the economy has been the main cause of the increase of employed in the tertiary sector which has been, by the quality of services, far below the one which is characterised for objectively most developed parts of the City of Belgrade.

The employment in the City of Belgrade is not drastically reduced, especially when compared with the decline in the production, i.e. earned income. The total earned income in millions of the US dollars on the territory of the Belgrade area, however, decreased more than fivefold during the last decade of the 20th century. The central urban municipalities with the highest income clearly stand out. The particularly low level of this index is the characteristic of the suburban municipalities. The tertiary sector, in accordance with employment, has the highest relative proportion in the creation of the national income of the urban municipalities, while other two sectors are dominant in the suburban municipalities. The economies of Lazarevac and Obrenovac have become mono-structural more expressively (coal production, i.e. power production), which to a certain degree also relates to the municipality of Mladenovac. The municipalities of Barajevo and Grocka are characterised by the increase in the share of the primary activities, i.e. agriculture in earning the national income, which is only the confirmation of their weak development.

Table 50: Changes in land use in the area of administrative area of Belgrade.

Municipalities	Area (km ²)	Agricult. land in total in %		Forest land in total in %		Building and other land in total in %	
		1971.	2005.	1971.	2005.	1971.	2005.
Vračar	3	-	-	-	-	-	100,0
Savski Venac	14	-	-	-	-	-	100,0
Stari Grad	7	-	-	-	-	-	100,0
Voždovac	149	63,8	63,1	20,8	19,5	15,4	17,4
Zvezdara	32	56,5	56,6	7,1	3,1	36,4	40,3
Zemun	150	75,1	68,3	6,6	-	18,3	31,7
New Belgrade	41	39,6	35,8	10,3	2,4	50,1	61,8
Palilula	447	66,9	66,7	16,9	13,6	16,2	17,1
Rakovica	30	-	41,4	-	13,3	-	45,3
Čukarica	156	63,4	53,1	16,8	3,2	19,8	43,7
Urban area	1.029						
Barajevo	213	76,1	71,1	19,5	22,5	4,4	6,4
Grocka	289	81,6	73,2	9,7	8,7	8,7	18,1
Lazarevac	384	69,6	60,5	18,4	16,9	12,0	22,6
Mladenovac	339	86,0	80,6	8,4	8,8	5,6	10,6
Obrenovac	410	81,3	74,6	7,5	7,6	11,2	17,8
Sopot	271	75,1	72,8	18,1	18,8	6,8	8,4
Surčin	289	-	69,4	-	8,0	-	22,6
Suburban area	2.195						
CITY of BELGRADE (AA)	3.224		68,1		11,6		20,3

Sources: Statistical yearbook of Belgrade, 1971, 2005 The City's Bureau for Statistics Nedović Z. (1986): "Changes in land use in the area of Belgrade". Collection of papers, Geographical Institute, Faculty of Natural Sciences and Mathematics in Belgrade, v. 33, Belgrade (p. 119-132).

The stated facts point to all the heterogeneity of the observed territory and conditional justification of its division into the urban part with a suburban one and the suburban part, considering that these are really two very different areas which have various categories of development within their internal borders. There are significant differences on the municipal level, as by the demographic, i.e. economic strength, so by the territorial scope of the observed municipalities, and consequently-the position, i.e. the role and the significance of each of them within the City of Belgrade. The differences have especially been expressed between the urban and suburban municipalities.

If we analyse the structures of areas, i.e. the shares of agricultural and forest land which is reducing as the consequence of the process of conversion into building land, we may notice that its scope increases as moving away from the central part of Belgrade.

The absence of agricultural and forest areas in the municipalities of Stari Grad, Vračar and Savski Venac testifies that the transformation process of this area is completed, i.e. it has clearly urban character. Other municipalities, particularly those which include the rural settlements, contain considerable proportion of agricultural and forest areas which are less prevailing in the urban municipalities than in the suburban ones (Table 50).

17.3. Spatial-functional changes in the settlements of the administrative area of Belgrade

The results of the transfer of active agrarian population into non agrarian activities and a whole series of changes caused by the transfer, first of all in the socio-economic structure of the population and agrarian-geographical landscape, have been used as reliable indicators not only for determining the spatial functional relationships and connections, but also for defining the functional types of the settlements. On the basis of those results the conclusions can be made on the role of some settlements in the functional organisation of the area of the City of Belgrade, i.e. its administrative area.

In the examined period, the presence of the process of the functional diversification of the settlements in the Belgrade area has been noticed, the character and flows of which were determined by the intensity of deagrarianization processes, expressed through the reduction of exclusively agrarian settlements on the account of the increasing number of those settlements which belong to other functional types, particularly the servicing one.

Table 51: Change of the number of settlements of the City of Belgrade according to the functional type.

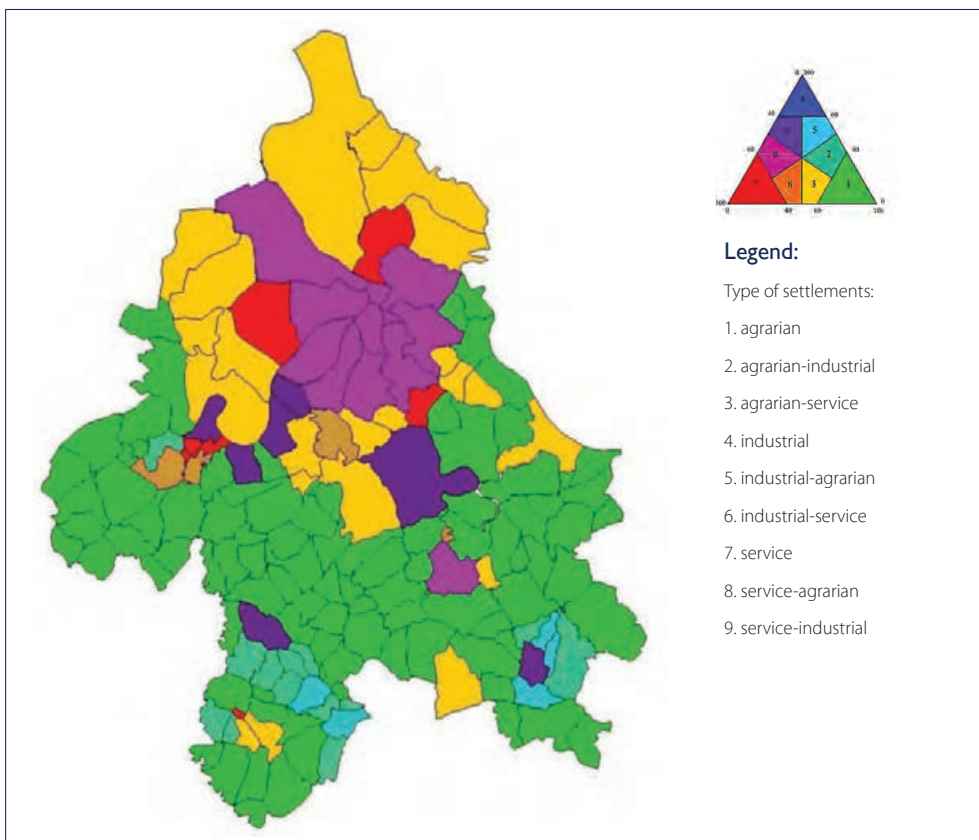
	1971	2002
Agrarian	92	8
Agrarian-industrial	13	14
Agrarian-service	24	23
Industrial	0	18
Industrial-agrarian	5	8
Industrial-servicing	7	16
Servicing	13	35
Service-agrarian	4	17
Servicing-industrial	6	25

According to the model of the settlement distribution by proportional share in the activity sector⁷⁵, by the 1971 census, the greatest number of the settlements of the observed area belongs to the agrarian functional type (92). That is especially emphasized in the suburban municipalities where, except the municipal centre with a small number of edge settlements, all other settlements are agrarian (Table 51).

According to the 1971 census, all urban municipalities, consisting of one part of the settlement such as Stari Grad, Savski Venac, Vračar, Zvezdara, New Belgrade, Rakovica, are classified into the functional type and marked as servicing, which means that they have at least 60% of the employed in the tertiary sector of activities.

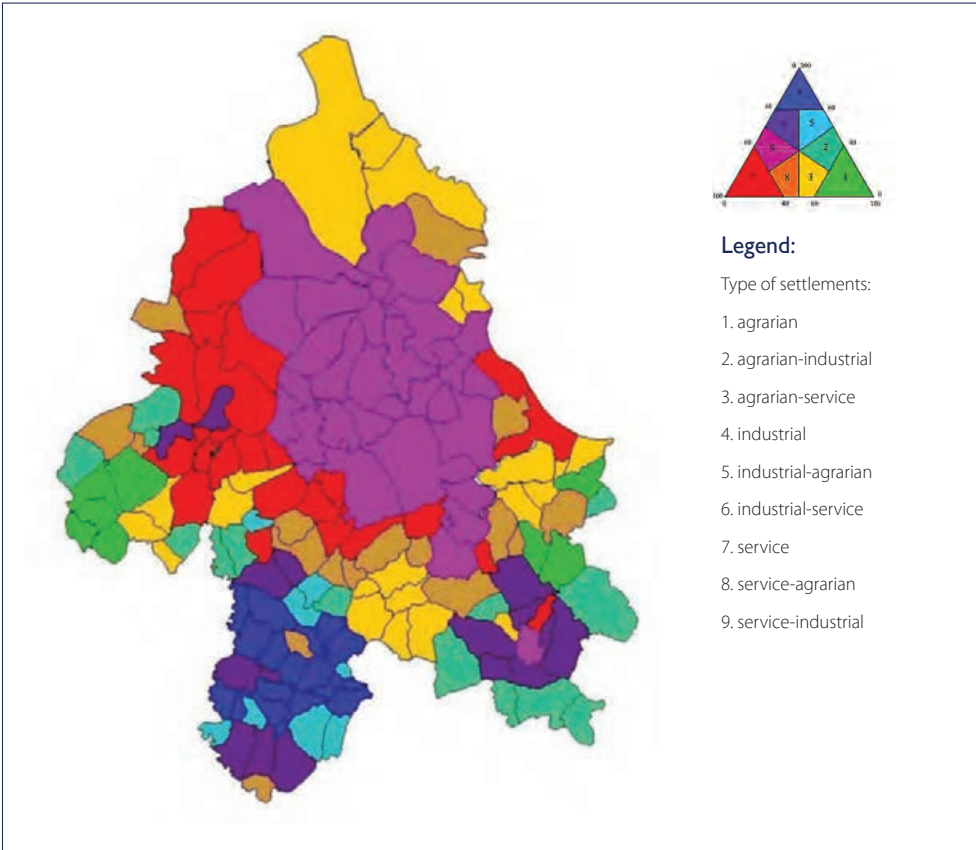
The urban parts of the municipalities of Palilula, Vozdovac, Čukarica and Zemun, are also in the category of the servicing settlements, while the process of the functional transformation is intensively present in other settlements, i.e. the increase in the share of the employed in the secondary and particularly the tertiary-quaternary sector, on the account of reducing the number of employed in agriculture. These are mostly agrarian-servicing settlements.

Figure 61: Functional type of settlements of the City of Belgrade (1971).



⁷⁵ More detailed on the model see in: Tošić, 1999. Spatial-functional relationships and connections in the nodal region of Užice; Doctoral dissertation, Faculty of Geography, University of Belgrade, Belgrade.

Figure 62: Functional type of settlements of the City of Belgrade (2002).



In the conditions of the insufficient development of the functions of labour in the municipal centres, the rural settlements of many suburban municipalities belong to the functional type of the agrarian settlements. The emigration of the rural working age population also contributed to it, so that by their employment the population decreased in village, but the structure of the activity has not changed much.

With the development of the functions of labour in the municipal centres and a smaller number of edge settlements, the migration process becomes active towards the centres, while the daily migration of workers gradually strengthens. By the transfer of a part of the employable contingent in the secondary and tertiary-quaternary activity sectors, the process of the functional diversification of village has began, expressed through the reduction in the share of clearly agrarian settlements and the increase in the share of agrarian-industrial and industrial-servicing settlements in the total number of settlements (Figures 61 and 62).

By the 2002 census, the significant decrease is established in the number of the agrarian settlements (from 92 to 8) on the account of one of the following categories (Table 51). The tertiary-quaternary activities, i.e. the number of employed in the sector of services, were at the peak in the last inter-census period. The central parts of all urban municipali-

ties are in the category of completely servicing settlements, except New Belgrade which is in the group of servicing-industrial.

The centres of suburban municipalities of Barajevo and Sopot, have more than 60% of employed in the tertiary-quaternary sector, while the presence of the mining-industrial complex of Kolubara on the territory of the Lazarevac municipality caused that this urban settlement and many others belong to the industrial category with more than 60% of employed in the secondary sector. The activities of coal and power productions have an influence on the territory of the municipality of Obrenovac, the urban settlement of which has the servicing-industrial characteristics. Other settlements of the suburban municipalities are with a lower degree of the functionality, but the process of the socio-economic transformation can be clearly noticed in them.

17.4. Intensity and spreading directions of the process of urbanisation in the territory of administrative area of Belgrade

In the process of the socio-economic transformation of the territory of the City of Belgrade, based on the spatial and social mobility of the population, the changes of different phases of urbanisation are manifested by the demographic, physiognomic and functional changes of the rural and urban settlements. Within the observed territory, some spatial wholes differ in the forms and degrees of urbanisation which is caused above all by the transitional phase of the urban settlement development (Tošić D., 1999).

It is difficult to determine the degree of urbanisation without adequate indicators, i.e. the urban way of life in the socio-economic, technological, cultural and other aspects, while it is even more difficult to express them qualitatively. The degree of urbanisation can be defined if these parameters are followed:

- share of active agricultural population in total active population;
- share of households without agricultural farm in total number of households in some settlements;
- share of contingent of employed in active population that is doing its profession.

On the basis of these parameters, five groups of the settlements are distinguished: urban, more urbanised, less urbanised, settlements on the threshold of urbanisation and rural⁷⁶.

According to the 1971 census, the results of the applied model on the territory of the City of Belgrade show the clear differentiation of the central city core. Also, there is a belt of a lower urbanisation degree characteristic for other settlements of the urban municipalities in accordance with the presence of agricultural areas, i.e. the development of the economic structure. Considerably lower urbanisation degree is the characteristic of the settlements which belong to the suburban municipalities. The mapping of the obtained results showed a vast area of the rural settlements within which there are enclaves of the higher degree of urbanisation (Figures 63 and 64).

⁷⁶ More detailed on the model see in: Tošić, 1999. Spatial-functional relationships and connections in the nodal region of Užice, Doctoral dissertation, Faculty of Geography, University of Belgrade, Belgrade.

Owing to the concentration of functions and population, the effect of the municipal centres of the suburban municipalities is a little more expressive. Therefore, Mladenovac, Lazarevac and Obrenovac influence the socio-economic, functional and morphological settlement transformation of the inner and outer surroundings. Their sphere of influence is mainly formed within the municipal borders. The positive socio-economic transformation, expressed through the expansion of urbanity from the urban settlement, is the most obvious in the edge settlements to which the intensive daily migration of labour is being developed. Some parts gradually grow together morphologically with the city and they receive the characteristics of the urban-rural continuum.

Figure 63: Degree of the urbanization of the settlements of the City of Belgrade (1971).

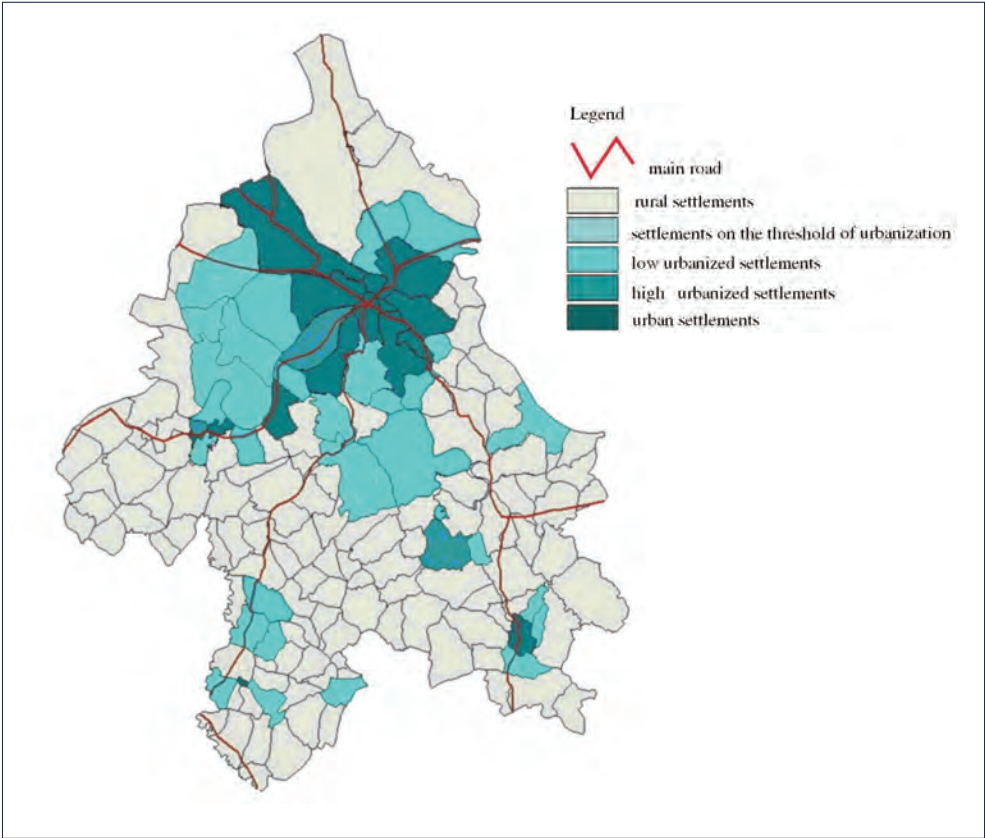
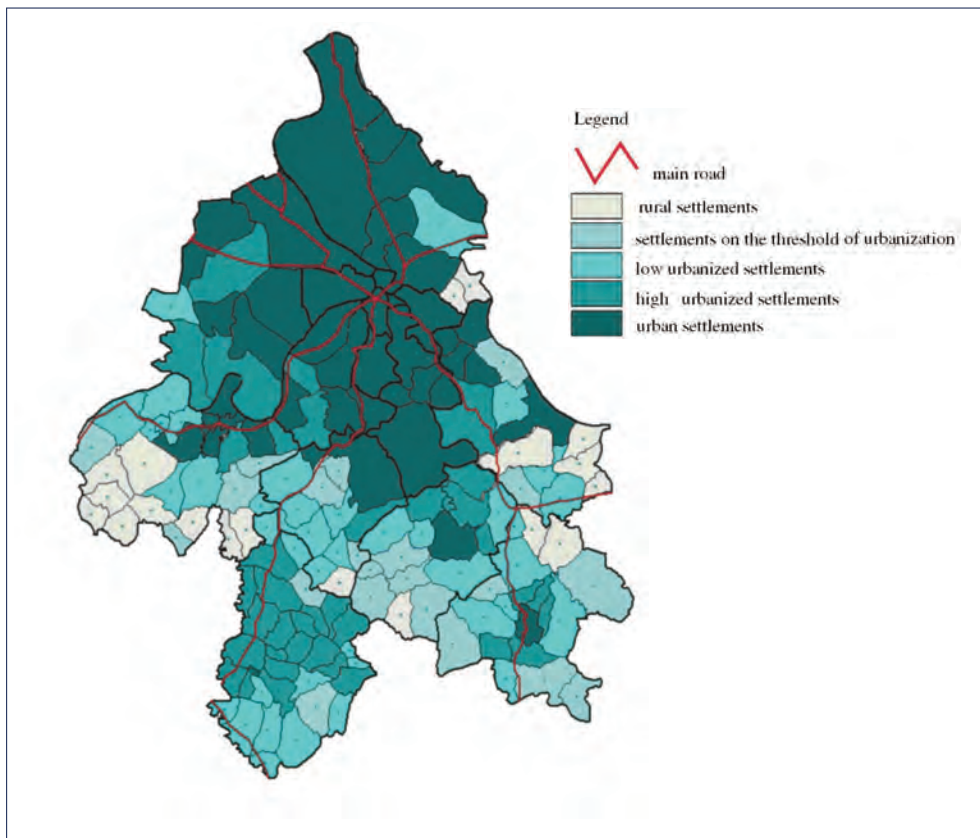


Figure 64: Degree of the urbanization of the settlements of the City of Belgrade (2002).



In 2002 the most urbanised zone of the central city core is still considerably distinguished (considerably expanded in relation to 1971), its direct surroundings is less urbanised and the urbanisation degree of the suburban municipalities is considerably lower (except the municipal centres and edged settlements).

On the basis of the applied model, 45 urban settlements are identified, which is for 31 settlements more in relation to 1971 (Table 52). The greatest number of these settlements belongs to some of the urban Belgrade municipalities (only 8 settlements of this area do not bear an attribute of the most urbanised).

The evident spreading of the process of urbanisation in the settlements of the suburban municipalities, as the consequence of the strengthening of their municipal centres on one side and the influence of Belgrade on the other, have resulted in decreasing number of the rural settlements for even 98 in the observed period.

Table 52: Change in number of settlements of administrative area of Belgrade according to categories of urbanisation.

Degree of urbanisation	1971.	2002.
Urban	14	45
More urbanised	3	38
Less urbanised	10	41
On threshold of urbanisation	20	21
Rural	117	19

17.5. Synthetic evaluation of the spatial-functional changes of the administrative area of Belgrade

Generally, the area of the City of Belgrade can be divided into three wholes where each of them has different characteristics. The first includes inner city core-ten municipalities (or their parts) which make the Belgrade settlement; the second one is associated to the suburban area which includes 20 surrounding settlements of Belgrade; and the third one relates to the suburban area, i.e. to seven municipalities out of the territory of the inner city and suburban part.

The Belgrade settlement, with about 1.120.000 inhabitants, is characterised by the population stagnation in many municipalities, insignificant population increase in the municipalities of Čukarica and New Belgrade, but also by the permanent depopulation in the central part of the city (the municipalities of Stari Grad, Vračar, Savski Venac). The city core has the characteristics of a long-range stable and developed functional structure with the insignificant share of the active population in the primary sector, and the dominant share in the servicing sector in relation to the productive sector of the activities. Over 85.000 daily migrants (workers and pupils) commute to the Belgrade settlement, which make about 5.4 % of the population of the whole City of Belgrade (Stamenković S., Gatarić D. 2008).

The public service facilities in Belgrade are of the republic significance, while the diversification of the functions is expressed most. The morphological changes of the Belgrade settlement have developed in accordance with the new approach of city planning-the internal construction of the city within the frames of building land, but, unfortunately, with more expressive elements of unplanned and illegal construction both in the central and elite parts of the city (Senjak and Dedinje).

The settlements of the suburban area, which belong to the municipalities of Zemun, Vozdovac, Palilula and Čukarica, have similar characteristics-the strong influence that the capital and the largest city has on them, but the characteristics and the ways are completely or to a certain degree differently demonstrated in the surrounding area. About 115.000 people live in 20 settlements, over 5000 inhabitants per settlement on the average. The population number in these settlements is very unequal and ranges from 250 to over 17.000 (Sremčica) or even over 30.000 inhabitants (Borča). This belt comprises almost 76 % of the area and about 27 % of the population of Belgrade (the territory of 10 municipalities). Averagely, the population in the settlements stagnates ($IR = 101.1$), the more expressive growth only Borča has (the settlement at the left bank of the Danube which, out of the former rural Banat settlement, grew into the largest urban settlement).

In the last 10 year-long period, the depopulation has also been more and more expressive in the settlements of the suburban belt, influenced mainly by the significant decline in birth-rate which was far lower in relation to the population growth (also including the refugees from the former Yugoslav republics who often settled this area).

Strong polarisation impact of Belgrade on suburban settlements is characterised by a large number of non agrarian and mixed settlements (65 %), especially in the part of Šumadija, less in the parts of Srem, while least in the settlements of Banat (Stojkov B., Tošić B. 2003). The process of deagrarization is weak or temperate in most of the settlements, because the more intensive flows of the population redistribution towards the servicing or productive activities were finished in the 1980s.

The number of the public services and communal facilities depends on the area where the settlements are located. In Srem, the number is characteristic to all large rural settlements, while in Šumadija, and particularly in the settlements of the part of Banat, there is a lack in the infrastructure facilities, especially the public service facilities (education and health).

According to their functional organisation, these settlements have different character. Some of them are the housing suburbs, separately formed settlements, originated in the core of old rural areas of the former Belgrade periphery. Other ones are mainly weekend settlements, while the third have already been formed as housing-industrial settlements or they have still been forming. Finally, the settlements of the Banat, Srem or the Danube parts are of the primary or a higher level functions- processing of agricultural products (Agricultural Plant in Padinska Skela, Borča). Generally, the greatest number of the settlements of the urban-rural belt is in the function of the production and services of the inner city area, so they are characterised by high share of the employed population in non agrarian activities and stable daily migration of workers.

The illegal construction is almost characteristic for all settlements of the edged belt and it is especially expressed in the settlements of Banat, in the direction of Zrenjanin and in Srem, as well as in the suburban settlements of Šumadija where there is also an enormous weekend construction.

Above the fact that the suburban belt of Belgrade represents the area 'attacked' by the illegal construction, it does not have clear economic orientation, it has inappropriate communal facilities (particularly the part of Banat), inadequate public service facilities and a high degree of the spontaneous development, so that it needs the city planners' engagements.

Seven suburban municipalities (Barajevo, Grocka, Lazarevac, Mladenovac, Obrenovac, Sopot and Surčin) are the third whole of the Belgrade administrative area. They are under the strong influence of Belgrade on one side, while on the other side they represent independent areas in which the development of the settlements is based on the resources of the local or broader regional and state significance.

The population number, the number of settlements and density of their network are unequal in some municipalities. The average population in the settlements out of the municipal centres is 1000 to 2000 inhabitants (except in the municipality of Grocka, where some of the settlements are much larger). Averagely, due to the domination of

the municipal centres, the population number in all municipalities mainly stagnates, although almost 70 % of the settlements are in the process of depopulation. The increase or the stagnation of the population have only been in the municipal centres, the larger settlements, the better located settlements (along important lines of communication) or the surrounding settlements of larger municipal centres, but even there the population increase has considerably reduced in the last period.

The structure of the active population is diversified in the settlements and its peak is in the municipality of Lazarevac. The process of very intensive deagrarianization up to the 1990s brought to the formation of the large number of non agrarian settlements, over 62 %. The active population, registered according to place of residence, makes a large number of daily migrants: productive or servicing sector of Belgrade (the municipalities of Surčin, Brajevo and Sopot), servicing sector of Belgrade (workers of larger non agrarian settlements of the northern part of the Grocka municipality) mining and power on the territory of the same municipality (all the settlements of the municipality of Lazarevac), or on the territory of the same or another municipality (workers of the non agrarian settlements of the Obrenovac municipality), i.e.-daily migrants who are mainly employed in the same or other settlements on the territory of the municipality (the settlements of the Mladenovac municipality). The lignite exploitation in the middle part of the Lazarevac municipality, about 50 km southwest from Belgrade, was the cause of disappearing and displacing the population of some settlements.

The number of the public service and infrastructure facilities is, generally, on the level of the average of the corresponding number in the settlements of central Serbia, or it is slightly below this average to which the closeness of Belgrade influenced. The economic structure in the centres of 7 municipalities is below the polarisation threshold of the surrounding settlements' development, while the illusory diversified economic structure of the population has only been the consequence of the high proportion of daily migrants towards Belgrade or towards the mining-power complex.

The major characteristic of seven observed municipalities is the largest number of the dispersed settlements (except in the Srem municipality of Surčin), even in the plains and on the gentle slope terrains. Only the parts of the settlements which 'descend' to the highway and regional lines of communication are of the straight, compact type, i.e. shaped or semi compact (the municipality of Grocka). A great number of the weekend projects 'flooded' not only the settlements, but the whole inter-settlement area, especially in the part of Šumadija-in the municipality of Sopot (southern part), in the municipality of Mladenovac (western part), in the Danube settlements of the Grocka municipality, in the southern settlements of the municipality of Barajevo, etc.

Together with the weekend projects, built illegally mainly, the whole area has been surrounded by massive illegal housing construction. This way of the construction is most expressive in the municipality of Grocka (estimation of about 25.000 to 30.000 projects), in the municipality of Lazarevac (in suburban settlements and settlements at the Ibar highway); in the municipality of Barajevo (in broader area of the municipal centre and along the Ibar highway); in the municipality of Mladenovac (in suburban settlements) and in the municipality of Obrenovac (northeast and south from the city core).

The common characteristic of the whole area is the non existence of the borders among the settlements; it is the area which is built continuously, on the land extremely occu-

pied by illegal and unplanned projects for the permanent, but more often for periodical residence.

17.6. Problem of constituting the metropolitan area - the functional region

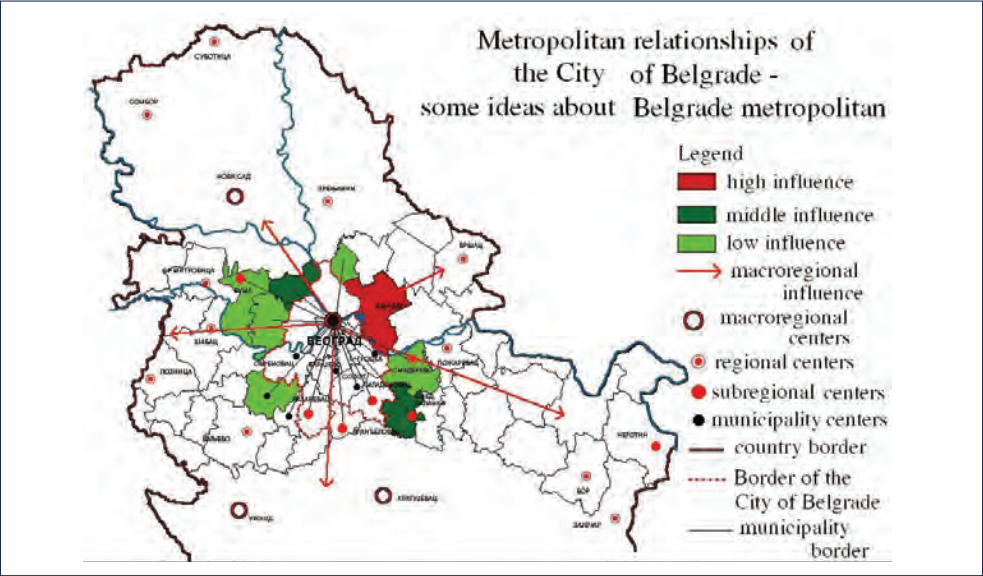
The status of Belgrade as the independent settlement or the centre of the administrative area, i.e. the City of Belgrade is clear because it is territorially defined. Unclearness, however, occurs concerning the metropolitan area of Belgrade because that area has not been defined either in theory or in practice. The model of the metropolitan area of Belgrade represents the central position of the metropolis in the gravitation area. Belgrade in its administrative area, which was formed in 1970s, has the peripheral position due to the forced limitation in the development of the administrative area by the creation of the Autonomous Province of Vojvodina. The administrative area of Belgrade is certainly smaller than the area which could be considered as the metropolitan, especially concerning the parts of Srem and Banat and also the link with the areas in the Velika Morava and Kolubara valleys (Tošić B. et al. 2004). If the border of the gravitation area was proportional to the demographic, economic and functional strength of the city, then some municipalities of Banat and Srem would rather be in the Belgrade area than in Vojvodina. The administrative border of Vojvodina was the obstacle in the functional expansion of the administrative area of Belgrade and it became as greater as the legal constitution of the provinces was firmer (Bojović B., Borovnica N. 1998). Since Belgrade could not form its functional region by its administrative area, first of all because their borders are not arranged, consequently, it did not affirm its metropolitan area.

Since there have not been more serious researches in regard of defining the Belgrade metropolitan⁷⁷, certain attempts were made in the last Regional Spatial Plan of the administrative area of Belgrade from 2004. Namely, the metropolitan of the city is defined, but for which it can be said conditionally that it represents its functional area. Therefore, 7 border municipalities of the Belgrade administrative area and the municipality of Ruma in Srem have been distinguished. The municipalities are divided into three categories according to the strength of the influence. The municipality of Pančevo is in the zone of the strongest influence, the municipalities of Stara Pazova and Smederevska Palanka belong to the zone of the middle influence, while the municipalities of Smederevo, Pećinci, Opovo and Ub (Figure 65) are in the zone of the weaker influence. It is mentioned in the same document that the borders of the functional area of Belgrade mainly coincide with the borders of its natural region.

The basic task is to carry out complexly the model of the territorial organisation of the Belgrade metropolitan which would enable the more qualitative sustainable development not only of this area but of the Republic of Serbia as a whole. The main principle, on which such model is based, is the simultaneous application of decentralised concentration which also means the regionalisation and local autonomy.

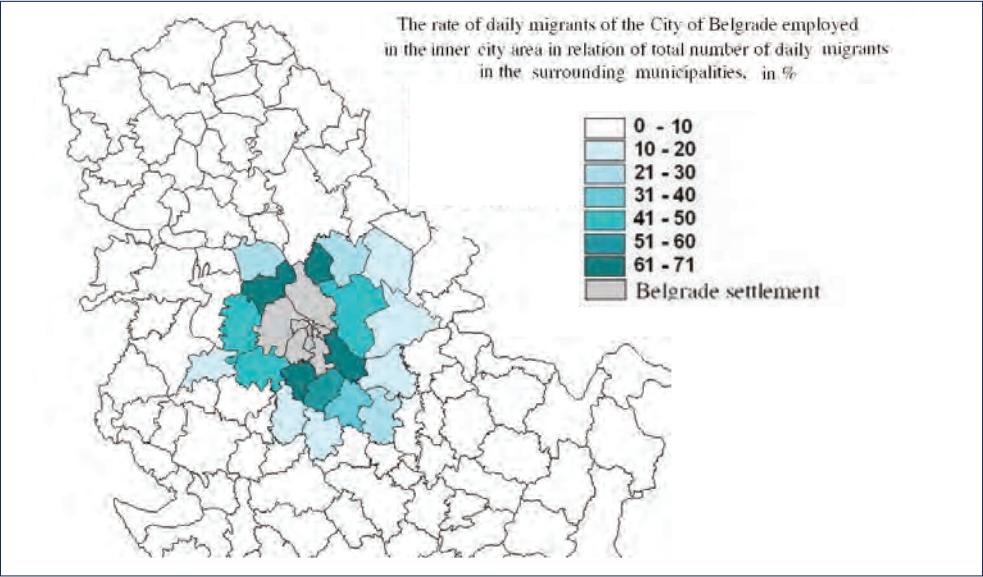
⁷⁷ The basis of such researches can be the results of the analysis of daily migrants of Belgrade: Stamenković, Gatarić 2008. Some Spatial Demographic Aspects of Daily Interaction of Belgrade and Surroundings Herald of SGS, vol. 88, no.2, Belgrade (p. 45-50). Over 120.000 migrant workers and pupils commute daily from almost 1200 settlements which is nine times more than the number of divergent daily migrants of Belgrade. Over two-thirds of the convergent daily migrants commute from the territory of the AA of Belgrade. Certain gravitational influences, according to this index, even exceed the borders of the mother country.

Figure 65: Belgrade metropolitan area in the Regional Spatial Plan of the City of Belgrade.



Beside results presented in The Spatial Plan of the City of Belgrade, there are other criteria that show possible Belgrade metropolitan area. The rate of daily immigrants is one of the best indicators for defining functional urban area, or metropolitan area of the Belgrade. All these dates also show that this territory should be much wider than the Belgrade administrative area. A few municipalities included in the City of Belgrade, and also some municipalities in its surrounding have more than a half immigrants, mostly employed workers, who every day go to Belgrade inner city area (Figure 66).

Figure 66: Daily migrants to the City of Belgrade and its surroundings (2002).



17.7. Conclusion

By the comparison of the obtained results on the analysis of the demographic flows and processes from the territory of the administrative area of Belgrade which is expressed by changes in the demographic capacity of some categories of the settlements with the results on the analysis of the changes in the structure of the active population activities, i.e. the results of the analysis on the degree of urbanisation of the settlements, the analogue can be noticed in the distribution of zones which unite the settlements of the higher functional transformation degree and the zones of the higher urbanisation degree, i.e. higher population density and immigration character and vice versa-the areas which include weakly urbanised or non-urbanised settlements and the settlements of the weaker functional transformation, i.e. the emigrational areas of lower population density.

The main bearer and regulator of the territorial-integration processes on the observed territory is, certainly, the settlement of Belgrade with the co-ordination of other functionally subordinated and complementary municipal centres of the suburban municipalities, the significance of which is far less expressed, but evident in directing the population flows and material goods. Namely, each of the municipal centres represents smaller or larger pole of attraction, concentration and divergence of the spatial-functional relationships and connections, on the intensities, directions and territorial range of which the field of their influence is being established. By expanding the urbanity from the Belgrade core, the surrounding settlements transform, making the suburban ring which gradually approaches and grow together with it spatially. The central business zone, which was formed on the territories of the central municipalities (Stari Grad, Savski Venac and Vračar), dominates the whole Belgrade area in the certain sense and it has also been formed in the New Belgrade municipality in recent years. The argument why the parts of the municipalities of New Belgrade and Zemun still do not represent the parts of the central zone has been based on the fact that they are not continuously leaned, but they are spatially and functionally distant and separate.

Observing the municipal centres of the suburban municipalities and their roles in the changes of the spatial distribution, natural development and socio-economic restructuring of the population, their significance in the development of the economic flows and workforce development, as well as in the socio-economic and functional transformation of other, non urban settlements, it may be concluded that there is a certain hierarchy among them. The municipal centres of Lazarevac, Obrenovac and Mladenovac can be observed in the same hierarchical level. Besides industry which is the basis of their role of the significant pole of the development, these urban settlements also accomplish their role of the suburban centre over the developed structure of other economic and non economic activities, which makes them the most significant centres of labour for the population from many surrounding settlements. Other municipal centres are in the following hierarchical level: Grocka, Sopot, Barajevo and Surčin (as newly formed municipal centre under the strongest influence of Belgrade), in the functional structure of which the tertiary activities are dominating. Their influence on the transformation of the surrounding settlements of the municipality is less and greatly supported by the influence of Belgrade.

The expressive heterogeneity of the observed territory points to the conditional justification of division on urban (also including suburban belt) and suburban part, taking into consideration that these two areas are very different which also have very different categories of the development in their internal borders. The differences are also noted among the urban municipalities, and first of all, that applies to the municipalities which are the part of the Belgrade settlement on the whole in relation to the municipalities which have, in their spatial range, the settlements of considerably lower degree of urbanisation which do not have the urban status.

Summing up the previous analytical findings on the regional development of the City of Belgrade (administrative area of Belgrade), it has to be emphasized that during the last ten years it has been exposed to numerous problems and difficulties, and particularly to negative developmental effects that did not spare any of its territorial parts, i.e. municipalities.

18. Pollution and environmental protection in Ljubljana

Dušan Plut, Metka Špes

The negative impacts of environmental pollution and development which is not in equilibrium with the natural self-cleaning and regenerating capacities of particular elements of the environment have in some places reached the point of endangering public health and well-being, thereby affecting the quality of life. When the anthropogenically changed environment starts to affect the quality of human life, these negative effects are particularly noticeable in urban and industrial ecosystems, and these environmental problems become increasingly important limiting factors for the development of many cities. Experts caution that the most acute problem for nearly all countries is the increasing share of the urban population. Its density is also increasing, such that the world is gradually becoming urbanized, even as living conditions in cities are generally worsening.

Ljubljana (population 267.000) and the whole of the Urban Municipality of Ljubljana (UML) is characterized spatially and environmentally by a geographical location in a large and densely settled pre-Alpine basin, a greater sensitivity of some environmental elements, a favourable location from the standpoint of transportation, a concentration of various economic activities and ongoing spatial expansion. The attractiveness of Ljubljana and environs as an area of development and hence desirable location on the one hand, and its spatial limitations and the sensitivity of some landscape elements on the other, exacerbate spatial and environmental conflicts. It is also typical of the urban development of Ljubljana that the long-term spatial and environmental dimensions of development and the public interest are subordinated to more narrowly conceived, short-term private and economic goals (Plut et al., 2006). At the same time Ljubljana as the capital of Slovenia is under the growing influence and impact of globalization and the wider challenges of sustainable development.

Different size, shape, geographical location, self-cleaning capacity, density of the urban population, economic orientation and level of prosperity influence the specific paths and measures taken for long-term sustainable urban development. A common and fundamental problem in creating sustainable cities is no longer a lack of arguments in support of green towns, but the question of which co-evolutionary strategy for urban development will have sufficient public and political support for the required sustainability breakthrough (Plut, 2007).

18.1. Environmental pollution and critical environmental problems of Ljubljana

The issue of environmental protection, alongside economic and social aspects of development, is becoming equal in importance in the planning of sustainable urban development in Ljubljana. From the standpoint of sustainable development the quality of

Ljubljana's environment has been an obstacle to development, but fortunately in most cases the degradation of the environment and its elements has not proved irreversible. A reduction of environmental pollution (through wastewater treatment, sorting and better management of solid waste, reduction of air pollution from industrial, energy, and urban sources) can already be seen in the improved quality of individual elements of the environment. However, problems relating to traffic congestion, increasing the attractiveness and accessibility of public transport, ecologically balanced land use, slowing of suburbanization, improving the attractiveness of residence in urban centres, and conservation of groundwater of suitable quality remain unresolved.

18.1.1. Air

A typical feature of most Slovenian cities is a valley or basin location. In addition to the concentration of population and resultant traffic, there are also numerous thermal energy and industrial plants, which are major sources of air pollution. This type of closed-in location often makes it impossible for environmentally damaging emissions to be distributed and dispersed to a greater distance and mixed with surrounding cleaner air. Most unfavourable of all are the frequent temperature inversions and associated fogs during the colder half of the year, which act as a lid beneath which the greatest concentrations of emissions appear. The average speed of the wind is only 1.3 m/s in January and 2.0 m/s in May, and the incidence of no wind is between 6 and 10 %, while the thickness of the inversion most often ranges from 200 to 300 meters. The closed basin location facilitates the creation of local winds and the city also directly influences them through its morphology and type of building and urban heat islands (Jernej, 2000). In the 1970s Ljubljana was one of the most polluted cities in Slovenia. In 1967 the highest 24-hour concentration of SO_2 reached a record high of $2400 \mu\text{g}/\text{m}^3$. Excessive pollution was caused by numerous individual chimneys as well as the thermoelectric heating plant which used coal with high sulphur content.

Measurements of air pollution in the UML take place at two "city" measuring points (Figovec, Ljubljana Bežigrad) and at the edge of the municipality (Vnajnjarje). The Figovec measuring site is at a location with extremely heavy traffic, but data on air pollution are, despite the spatial limitations of the representative data, nevertheless a suitable comparative indicator for the narrower urban region of Ljubljana. The measuring site in Bežigrad is outside the influence of major local sources and a suitable indicator for the air quality of the basin and wider urban environment (Okolje v MOL, 2004). For this reason we use primary data for the "city station" in further evaluation of data on general pollution of the air in the city of Ljubljana: the measuring site of Vnajnjarje is located in a hilly area and higher (630 m) region of the eastern part of the municipality (at the edge of the inversion layer) and represents a higher, better ventilated, and rural part.

Taking into account the type and quantity of energy sources consumed for particular activities it is clear that the greatest emissions are produced by energy plants, especially thermoelectric and heating plants, and by traffic, which is becoming an increasingly significant source, whereas the share of emissions from households is decreasing in significance as a result of the replacement of solid and liquid fuels with gaseous ones. The share of emissions from industrial activity in Ljubljana today is practically negligible; industrial sources even in former decades were never significant polluters of Ljubljana's air.

With the changed composition of emissions in the pollution of Ljubljana's air the seasonal nature of air pollution has also decreased, as the characteristic winter pollutants of SO₂ and smoke are being replaced by year-long ones (NO_x in CO₂) and pollution from the summer season (ozone).

Due to its basin location, high density of the population and associated economic activities, Ljubljana was ranked among Slovenian cities with the highest degree of air pollution beginning as far back as the 1970s, but by the end of the 1990s this pollution had decreased substantially (Špes et al., 2000). For several decades, up until the first half of the 1990s, average concentrations of sulphur dioxide (SO₂) exceeded permissible levels and were damaging to health. At the end of the 1960s average annual concentrations (SO₂) were around 250 µg/m³, more than four times the maximum permissible levels. In the 1980s they had dropped to around 100 µg/m³, in the 1990s below 50 µg/m³, and by the middle of this decade the values had dropped to below 10 µg/m³.

Table 53: Sulphur dioxide air pollution in Ljubljana.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of days on which levels exceeded the permissible daily concentration of 125 µg/m ³	1	1	0	0	0	0	0	0	0	0	0
Number of hours in which levels exceeded the permissible average hourly concentration of 350 µg/m ³	39	14	14	0	0	0	0	0	0	0	0

Note: for a more general illustration of pollution of the urban environment from sulphur dioxide data are taken from the Bežigrad measuring site – as representative of the wider urban environment.

Source: ARSO, Kazalci okolja (Environmental indicators), 2009.

Reasons for the reduction in SO₂ pollution of Ljubljana's air can be found mainly in the increased and more widespread use of gas for heating in the city and most of all in the replacement of domestic coal with higher quality imported coal with a lower sulphur content in the thermoelectric power and heating plant. This energy remains the main source of emissions (74.5 %), while 23.2 % comes from households. In the last twenty years the use of coal, for instance, in heating in Ljubljana has dropped from 15 % to 2 %, and there is also a noticeable increase in the use of natural gas: from 7 % to more than 30 % (Oikos, 2007).

Similar to the situation in other urban areas, traffic in Ljubljana is the principal source of nitrogen oxides, with concentrations dependent on meteorological conditions. Traffic remains a constant source of these kinds of emissions and contributes more than half (55.5 %); also important are emissions from energy converting plants, especially thermoelectric power and heating stations (28.3 %), while the remainder are emissions produced by households and industry (Oikos, 2007).

Concentrations of nitrogen oxides (NO_x, N_{ox}, NO₂) indicate, despite minor fluctuations, a moderate increase in pollution. In the period 1997 - 2004 the annual permissible value (40 µg/m³) was frequently exceeded at the Figovec measuring site. In 2003 the hourly permissible value (200 µg/m³) at Figovec was exceeded for a short time on 17 occasions, and in 2002 it was exceeded 21 times. Since the density of motorized traffic in Ljubljana is increasing and at the same time EU regulations on maximum permissible values for

NO_x are becoming more stringent each year, we can realistically expect even greater exceeded values in the future (Okolje v MOL, 2004).

The highest concentrations of nitrogen oxides are measured along busy roads, but with the use of catalytic converters in cars these emissions are being reduced. However, a faster reduction is hindered by the increase in the use of diesel motor vehicles and increasing average engine size (the irrational use of more powerful vehicles for city driving).

Table 54: Air pollution in Ljubljana from nitrogen oxides.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Average annual concentrations of NO_2 (annual permissible value is $40 \mu\text{g}/\text{m}^3$)	36	42	49	38	36	50	59	59	27*	29*	28*
Number of hours in which levels exceeded the permissible hourly conc. $200 \mu\text{g}/\text{m}^3$ (maximum allowable is 18 hours)	0	3	2	0	0	0	0	0	0*	0*	0*

Note: * data for the Bežigrad measuring station (for an illustration of air pollution from nitrogen oxides data from the "city" measuring site of Figovec were used until 2004, while for the last three years, when this station was excluded from automatic measurement for the national network, data from the Bežigrad station were used).

Source: ARSO, Kazalci okolja (Environmental indicators), 2009.

In recent years an excessive concentration of ozone has become an increasingly important problem in protecting the air of Ljubljana. The number of times that the daily maximum permissible concentration of O_3 is exceeded is greatest from April to August. In contrast to concentrations of SO_2 and NO_x the annual, daily, maximal hourly and eight-hourly concentrations are greatest at the edge the city (the Vnajnjarje measuring station). Average annual concentrations of ozone fluctuate from year to year due to the different number of sunny days and the intensity of solar radiation (Okolje v MOL, 2004). In addition to locally produced pollution there is also a noticeable influence in the higher elevation edge of the city from the Padua lowlands, hence in some years maximum permissible daily and hourly values were frequently exceeded, on virtually the majority of days in the clear, dry, hot summer periods without wind. The concentrations of O_3 measured at the site in the centre were lower than the values at other measuring sites. The cause was the heavy motor vehicle traffic and its associated emissions of nitrogen monoxide, which due to chemical reactions reduce the creation of tropospheric ozone.

During the period studied the short-term maximum permissible thresholds of ozone in Ljubljana were exceeded more frequently than those for SO_2 and NO_x .

In the past unfavourable weather conditions contributed to very high concentrations of SO_2 , produced by relatively small amounts of emissions from solid fuel stoves with low chimneys. This should be taken into account in traffic as well. A density of traffic which in many better ventilated cities would not cause excessive harmful concentrations of substances produced by traffic can already pose a hazard in Ljubljana.

Table 55: Air pollution in Ljubljana due to ozone.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Number of days on which target values of ozone were exceeded (average eight-hour concentration of 120 µg/m ³)	30	20	20	49	40	25	81	32	38	47	43
Number of days on which warning values were exceeded (more than 180 µg/m ³)	7	2	0	3	1	4	18	4	11	10	8

Source: ARSO, *Kazalci okolja (Environmental indicators)*, 2009.

From the standpoint of the internal differentiation of Ljubljana with respect to air pollution, the most important finding is that for decades large differences in SO₂ immissions were a key factor in the varying quality of the urban environment in different parts of Ljubljana, whereas in the 1990s traffic emissions were the predominant cause of urban air pollution. Due to the growth in particular of traffic emissions (and noise) and of ozone, in the 1990s, a new immissions area, covering a large part of the city centre and the areas directly adjacent to the most heavily traveled streets, urban arterials, and the ring road, gradually took shape in the UML. Based on the growing pollution of Ljubljana's air with "traffic" emissions (nitrogen and carbon oxides and ozone), the areas that stand out are the city centre on the one hand and the immediate vicinity (up to 100 m) of urban arterial roads on the other (Špes et al., 2002).

With the use of diffuse sampling instruments, measurements of nitrogen dioxide, benzene, and ozone were conducted at 30 - 80 sampling sites (road corridors, along roads outside corridors, the urban hinterland in summer (2005) and winter (2006) (Ogrin, 2008). Results show that the concentrations of pollutants were exceeded in numerous places; most polluted were road corridors, where the average annual concentration of nitrogen dioxide exceeded 80 µg/m³. In winter the concentrations of nitrogen dioxide were greater than in summer, because the atmosphere is more stable and the emissions burden greater due to the higher fuel consumption and colder engines.

The air was considerably polluted along major urban arterials, although not at locations along the road corridor where there are usually large residential neighbourhoods. Areas of the urban hinterland usually have lower concentration of nitrogen oxide but on the other hand the concentrations of ozone there are greatest, which is in accordance with what we would expect given the chemical properties of the creation and decomposition of ground ozone. However, it should be pointed out that there are also extensive residential neighbourhoods in these areas outside the urban core. Results show that the city topography is at least as important as the traffic load of roads when looking at air quality along Ljubljana roads. Local meteorological conditions are also important (Ogrin, 2008).

Experts (Planinšek, 2006, 61) warn that data on air quality in Ljubljana show that the air is excessively polluted primarily by particulate matter and ozone as well as by nitrogen oxides, and a large share of this pollution is caused by emissions from traffic. The region of the Ljubljana municipality ranks in the second of three levels of air pollution, and the recommended values for air quality will be difficult to achieve based on the current state.

18.1.2 Noise

Noise is becoming one of the most important factors in the quality of the residential environment, but it depends largely on microlocation, hence it is not possible to generalize about a wider urban environment based on individual data. In a quiet residential area and near hospitals, schools, and kindergartens, noise must not exceed 55 dBA. A noise level between 55 and 60 dBA is already disturbing, while above 60 dBA it is no longer suited for a residential area.

In 2001 numerous short-term measurements were made at 112 locations, the majority of them in Ljubljana residential neighbourhoods. At the same time an extensive survey of residents on noise was carried out. Based on the measurement results, data on traffic volume, and the results of surveying residents of Ljubljana, a classification of Ljubljana was carried out with respect to noise pollution (Špes et al., 2002; Okolje v MOL, 2004).

The following areas, which taken together are home to 50.000 residents, or about a fifth of the total population of Ljubljana, were found to be areas with above average noise pollution:

- the wider area of the city centre. An increased level of noise is the result of a number of factors. Several streets are subjected to above average traffic volumes, and moreover due to the number of intersections the traffic flow is characterized by stops and starts, acceleration and braking. There are also diverse service activities and dense pedestrian traffic flows, which in itself is not problematic as far as the amplitude of the noise produced, but because this type of noise is also present at times when road traffic, which is the main source of noise pollution, drops off (for example in the evening or night hours and at weekends);
- areas along major roads. The areas along roads that produce above-average noise pollution are of varying widths; their extent is influenced not only by the traffic volume but also by the presence and siting of buildings along the roads. In general roads with daily traffic volume of more than 20.000 motor vehicles (this number is just a rough guide) are the most problematic from the standpoint of noise pollution, unless they are equipped with suitable anti-noise barriers such as those found along the ring road. Above-average noise can also be detected in buildings which are sited directly along roads with less traffic, especially the numerous roads in the wider area of the town centre, as well as a number of roads outside the city centre;
- areas along the railway. This is a relatively narrow belt along the railway line, but the noise associated with rail traffic is especially intense and continues throughout the day, although at night it usually declines;
- if it were possible to record more precisely point sources of noise, we could determine areas with above average levels in the vicinity of these sources, but in our case we can only note that these are very different types of buildings, such as for example manufacturing plants, bars and restaurants, event halls, churches, playgrounds, etc.

As areas in which noise in general does not represent a significant problem we can designate purely residential areas which are not close to major roads. The majority of areas

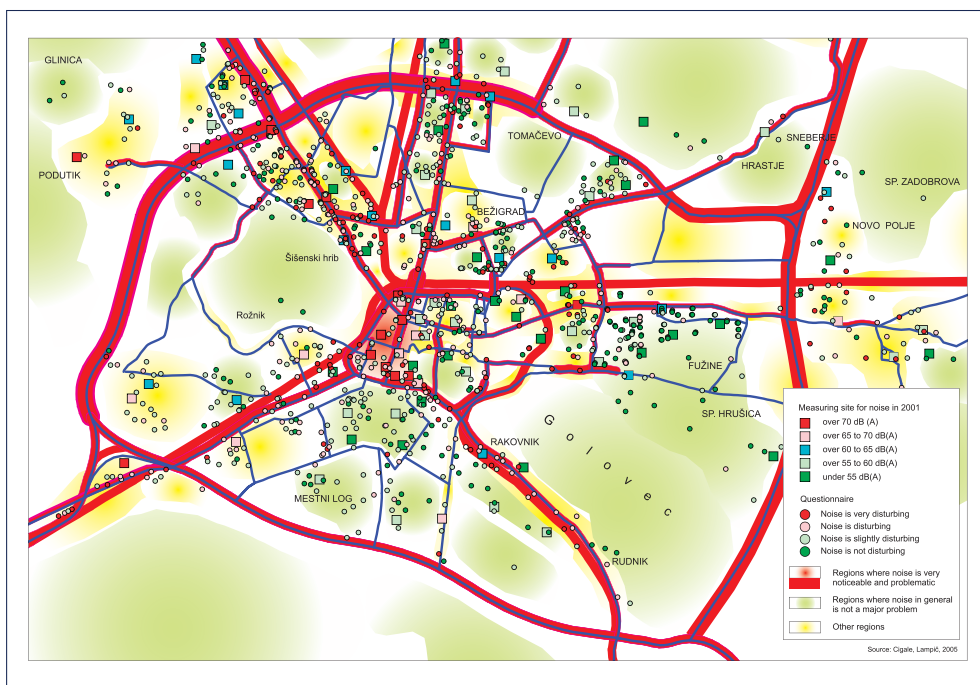
at the edge of the territory of the settlement of Ljubljana, which are sparsely settled and intended for agricultural, recreational, and forestry uses, belong in this category.

The category “areas with variable noise” included diverse areas, including those which have no residential buildings but are the site of various secondary and tertiary activities. In at least some of these the noise is considerable. Loud industrial plants can themselves be a source of noise or it may be a function of the concentration of tertiary activities which cause extensive traffic flows. The relocation of these activities away from the centre of the city reduced the traffic flows to the centre, which from the standpoint of noise is favourable, but for the immediate surrounding area in the new locations of these retail and service centres it is rather less favourable, since new areas of noise pollution took shape.

In this category also belong residential areas for which according to available data there is a great degree of internal differentiation from the standpoint of noise pollution, or these values do not stand out in either direction.

It is clear from the results of research on noise in Ljubljana that the most significant source of noise is traffic. The nighttime and daytime levels of noise in residential neighbourhoods outside city centres are on the whole in compliance with domestic as well as international norms. The levels of noise in some places in larger residential settlements occasionally exceed maximum permissible values or borders on them. Noise along major arterials exceeds permissible values.

Figure 67: Summary map of regions of Ljubljana with respect to noise pollution.



18.1.3 Water pollution

Pollution of rivers

Rivers and streams in the territory of Ljubljana represent the central part of Slovenia's Sava river basin; their quality is the result of both allochthonous and autochthonous pollution as well as self-cleaning capacities. In the last decade analyses of water quality of rivers and streams in the territory of Ljubljana have classified them as moderately, severely, or critically polluted water resources. Only a few streams in the sparsely settled and higher eastern edge of the municipality are practically unpolluted.

The central Ljubljanica River at the place where it enters the territory of Ljubljana is as a rule moderately polluted (2nd- 3rd quality class); its condition worsens considerably by the time it reaches the confluence with the Sava (past the city), where pollution levels are already excessive. Thus on average the quality of the Ljubljanica in the territory of UML decreases and it is ranked among rivers with a progressive degradation regime and one of the most polluted surface watercourses in Slovenia. This has been confirmed also by saprobiological and bacteriological analyses: in the lower reach of the Ljubljanica there are often high bacterial counts present throughout the whole period. Hence the river meets criteria for bathing quality in only a few places. High levels of metals (especially chrome) have also been found in the river sediments of the Ljubljanica. The source of these pollutants are factories in Vrhnika; increased concentrations of nitrogen and organic compounds have also been found, indicating the inadequacy of the sewage and wastewater treatment network (Okolje v Mestni..., 2004). More recent data on the quality of the Ljubljanica (after 2003) indicate a slight trend towards improvement, and there was an observable improvement in 2005, when a new wastewater treatment plant for discharges from Ljubljana went into operation. In the period from June 2007 - June 2008 the chemicals content of the Ljubljanica at all sampling sites in the territory of Ljubljana was found to be acceptable, but the water quality was still not suitable for freshwater fish and did not meet minimal hygiene standards (Monitoring kakovosti..., 2008).

The Sava where it enters the territory of the Ljubljana municipality has over the past decade usually ranked among moderately polluted watercourses, but past the city and in particular after the inflow of the Ljubljanica its state changes to excessively or even critically polluted. Slight improvements in the quality of the river have been indicated by data after 2000, and the most recent data should show even greater improvement of the quality of the Sava's water due to the effects of treatment of municipal discharges.

An analysis of trends in the changing quality of the Ljubljana section of the Sava River and the Ljubljanica in the period from 1997 - 2007 showed the following key characteristics:

- an essential improvement of quality in the Sava before its confluence with the Ljubljanica;
- little change in the moderate degree of pollution of the Ljubljanica in the territory of UML up to the point where wastewater from the Ljubljana wastewater treatment plant is discharged;

- no change in the critical degree of pollution of the Ljubljanica in its lower reach up until the of the construction of the new wastewater treatment plant;
- data on the chemical state of the river (2002 - 2006), which has been monitored since 2002 (in accordance with the European Water Directive), show a relatively favourable situation. With just one exception, the Sava and the Ljubljanica did not contain hazardous chemicals. Only one chemical analysis of the Sava in Medno in 2002 indicated traces of mercury in sediments in the river before it reached Ljubljana, and after Ljubljana there were also detergents, mineral oils, and organically bound halogen (Monitoring kakovosti..., 2008). The ecological state of the water has not yet been assessed due to methodological problems.

Table 56: Quality of the Ljubljana Sava and the Ljubljanica (1998 - 2005).

Water flow	Measur-ing site	1998	1999	2000	2001	2002	2003	2004	2005
Sava	Medno before LJ	2-3	2- (3)	2- (3)	2	2-(3)	2-(3)	1-2	2
Sava	Šentjakob past LJ	2-(3)	2-(3)	2-(3)	2-(3)	2-(3)	2-(3)		2
Sava	Dolsko past LJ	3-(4)	3-(4)	3	3	(2)-3	3	2	2
Ljubljanica	Livada before LJ	2-3	2-3	2-(3)	2-(3)	2-3	2-3		2
Ljubljanica	Zalog past LJ	(3)-4	4	(3)-4	(3)-4	(3)-4	3-3/4	2-3	2

Source: Monitoring... ARSO, 2007.

Pollution of groundwater

With respect to the drinking water supply, the main source is the groundwater of Ljubljana Plain, which supplies about 90 % of the water required. The southern part of Ljubljana is supplied from Iški vršaj in Ljubljana Marsh. Average water consumption in Ljubljana is 1200 l/sec, and the average quantity of pumped water ranges from 1800 l/sec to a maximum of 2300 l/sec. To the amount of water actually consumed we must also add losses that occur in the delivery of the water to users. Data show that 46 – 50 % of the water pumped is lost along the way, hence the quantity of water taken from the groundwater is much greater than the amount of the average consumption or the quantity of water sold. Considering the decline in the growth rate of urbanization and associated demand for drinking water, especially with more rational use, the future supply is ensured, but it will be more difficult to maintain its quality. In the case of pollution of existing pumping areas, supply of drinking water could be a very big problem, and it would be necessary to replace it with a large quantity of water of suitable quality.

Principal threats to the groundwater are inappropriate environmental impacts (flow regulation, land reclamation), overexploitation of water resources, and environmental pollution. Inappropriate impacts and exploitation have negative effects in particular on the quantity of groundwater, and emissions of waste and toxic substances into the environment on its quality. Industry in the Ljubljana region produces 10 million m³ of wastewater annually, some of which is so heavily polluted that it must be treated be-

fore being discharged into the public sewer system. Household wastewater usually contains organic pollutants and the groundwater is polluted by bacteria, viruses, nitrogen compounds, and detergents. The groundwater in Ljubljana Plain is polluted by hobby gardeners as well as by farming, which is oriented mainly towards the production of vegetables and fodder. In addition to the use of pesticides and herbicides, fertilizer use also causes problems in water quality. The leaching of unused nitrogen into the groundwater due to excessive application or the use of fertilizers at inappropriate times causes higher concentrations of nitrates in the groundwater, while fertilization with naturally produced manure or slurry causes bacteriological pollution.

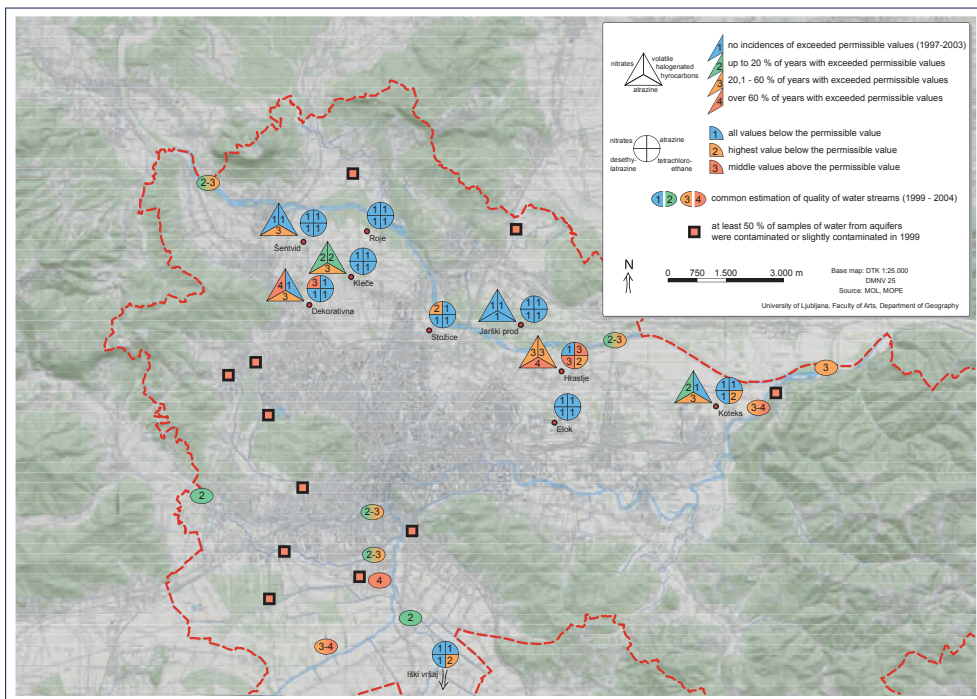
Nitrates in the underground water of Ljubljana Plain appear mainly due to inappropriate or excessive fertilization and substandard or antiquated sewer networks. In the period from 1997 - 1999 there was a growth in the concentration of nitrates, while after 2000 a slight drop was recorded (Monitoring... 2006, 2008).

Pesticides in the groundwater are usually a consequence of excessive and inexpert use in agriculture and in nonagricultural areas such as public green spaces, gardens, and areas devoted to transportation uses (Okolje v Mestni..., 2004). In the period 1997 - 2007 there were high concentrations of the pesticide atrazine as well as its metabolite desethylatrazine. In recent years the content of atrazine has been somewhat reduced, which is likely a result of the banning of the use of this pesticide in water protection areas.

Volatile halogenated hydrocarbons in the groundwater of Ljubljana Plain are the result of degreasing in industry and small businesses (dry cleaners, metalworking shops, and similar). Up until 1999 volatile halogenated hydrocarbons were present only in traces or low concentrations, but in 1999 significantly higher concentrations were recorded (Okolje v Mestni..., 2000). The concentrations of all the most important observed pollutants (nitrates, chromium, pesticides and metabolites, volatile chlorinated hydrocarbons) were lowest in the immediate proximity of the Sava River. The reason for this is the shorter retention of underground water and associated reduced possibility that the water-transporting layers are "enriched" with runoff having a higher content of pollutants from the surface.

In recent years (2002 - 2007) the quality of groundwater in Ljubljana Plain has not significantly changed, although the concentrations of some substances have been reduced. Typical of the region as a whole is a gradual reduction in the concentrations of pesticides, but nevertheless excessive concentrations still appear at particular locations (Monitoring kakovosti..., 2008).

Figure 68: Quality of water resources of Ljubljana (1997 - 2004).



18.1.4 Soil degradation

The content of heavy metals and other chemical elements in the soil (and vegetation) is an important indicator of the state of the environment and draws attention to long-term pollution. Detailed analyses of the content of chemical elements in the soil in the Ljubljana region (168 km²) have indicated large local differences in the degree of pollution of urban soils and other so-called urban sediments from heavy metals (Šajn et al., 1998). The spatial distribution of the presence of cadmium (Cd), lead (Pb), mercury (Hg), copper (Cu) and zinc (Zn) in the soil shows that it is not a function of the lithological substrate and type of soil. Extremely high values could be found in the vicinity of major roads, intersections, industrial and energy plants, waste dumps, households, and other minor sources. Special attention will need to be given to traffic emissions and investigation of the current state and trends regarding heavy metals in the layer above the groundwater in regions where it is used to supply drinking water to the population.

In the framework of the URBSOIL project in 2002 and 2003 the Centre for Soil Science and Environmental Protection at the Biotechnical Faculty (2005) conducted a systematic study of the quality of 250 soil samples from 130 locations in the Ljubljana region (depths of 0 - 10 and 10 - 20 cm) with different uses: playgrounds at kindergartens, parks, river banks, green spaces along roads and intersections, primary school playgrounds, and hobby gardens. From the standpoint of spatial development planning, the following findings from the monitoring of urban soils in Ljubljana are significant (Sofinanciranje EU projekta..., 2005) :

- soil salinity (due to salting of roads in the winter season) is not (yet) in evidence as a major problem;
- among heavy metals, lead (Pb) was the most common pollutant of the soil; the permissible value was exceeded at 52 locations in the upper layer (10 kindergarten playgrounds, 10 primary school playgrounds, 14 parks, 14 green spaces along roads and intersections, and 4 hobby gardens), and the warning value at 44 locations (including 7 kindergarten locations and 8 school playgrounds!); the more or less even distribution of increased concentrations of Pb in the city centre indicates dispersed pollution;
- the numbers of permissible and warning values exceeded in the upper layers for other heavy metals were as follows: zinc (Zn) - 22 and 5, copper (Cu) -17 and 2, cadmium (Cd) - 13 and 1.

Findings from a comparative analysis of soil samples from 1991 and 2002 showed somewhat higher values in 2002 than in 1991 for the majority of heavy metals. A comparison of concentrations of particular metals in 2002 compared to the average in 1991 indicates a moderate trend of increase in the presence of lead in the upper soil layer and a slight trend of increase in the concentrations of zinc, cadmium and nickel in the upper layer, while the presence of chromium and of iron was somewhat less (Sofinanciranje EU projekta..., 2005).

The results of monitoring of soil pollution in water protection areas of the UML in 2006 showed that concentrations of toxic substances (herbicides, pesticides, heavy metals) were for the most part below the legally prescribed values but in some specific instances permissible values were exceeded (Monitoring onesnaženosti tal..., 2007). The threshold values of arsenic and cadmium were exceeded, as was the warning value of lead. Sources of heavy metals were in all likelihood traffic or fallout from the air. The results of an analysis of the residue of phytopharmaceutical substances in the soil in the territory of the UML showed that the heaviest concentrations were from triazines, especially atrazine, followed by the metabolite desethylatrazine (Okolje v MOL, 2004).

Point source pollution of the soil by phytopharmaceutical and other substances in the territory of the UML is also caused by numerous illegal waste dumps, which are also a major threat to underground water. Potential and actual pollutants of the soil and water resources (especially groundwater) are also produced by some hobby gardeners. On average four samples out of seven of soil from vegetable gardens exceeded permissible values for DDT and derivatives, and at one location warning values were also exceeded (Sofinanciranje EU projekta..., 2005).

18.1.5. Solid waste

A critical manner of solid waste management in Ljubljana is the final dumping of usually unseparated solid municipal waste at the Barje landfill (Okolje v Mestni..., 2000).

348.000 people from the gravitational area of Ljubljana (formerly the municipality of Ljubljana) and the area of Kamnik are included in the waste collection and dumping system of the Barje landfill. In 2005 137.000 tons of waste were collected and deposited (Letno poročilo..., 2006).

The Barje municipal waste landfill is located in the southern, flat, and marshy area of Ljubljana along the southern bypass. Due to its location in a flood-prone area the landfill is classified as being in a high-risk area. The total area of the landfill was 89 ha in 2003 and it is divided into an old and a new part. The area is de-gassed, planted with grass and poplars, and a constructed wetland for leachates has been set up (Okolje v Mestni..., 2000).

The new part of the landfill began operating in 1987 and covers an area of 42 ha. Of a total of five waste deposit fields, three are partially or completely full; the fields were expected to be able to provide enough space for the dumping of waste until 2010 (Okolje v MOL, 2004, 53).

A great potential danger of pollution of pumping stations in Ljubljana Plain is represented by numerous illegal waste dumps, despite the fact that 99 % of the population in the territory of the UML have access to the waste collection and disposal system. An extensive census of waste disposal sites in water protection areas of the UML from 2006 recorded 1586 illegal waste dumps (a third of them still active), of which there were 1445 in Ljubljana Plain, 104 in Iški vršaj, and another 37 in areas of local water resources (Smrekar et al., 2006). Their total area was 128.056 m², volume was 220.071 m³, and the dominant type of waste was construction materials. Not much hazardous waste was detected, but it nevertheless represents a threat to the quality of the groundwater, especially waste which is organic. The UML in the past has cleaned up a large number of illegal waste dumps. However, measures have turned out to be only temporary in their effects, since enforcement policies are ineffective.

In the region under study we found that only a small portion of waste is sorted by type for recycling, even as the quantity of household waste is constantly increasing. On average 382 kilograms of household waste per capita are collected in this region (the Slovenian average is 297 kg). In 2007 less than 20 % of waste was separated for recycling: the majority of it is still mixed waste which is hauled to the Barje landfill (Snaga, 2007). Separation of municipal waste began in 2002, and over the next five years about 1400 collection sites were set up, on average one for every 185 inhabitants. In the fall of 2005, biological waste also began to be collected separately. This is relatively favourable in comparison with other EU cities, but on the other hand it is unfortunate that the quantity of separated waste collected is still so small. Since the first year of separated collection of waste, when only 4 % was separated, the share rose each year by several percent but by 2006 it had reached only 16 % (Holc, 2007). Hazardous waste is collected at a special collection centre at the Barje landfill and by means of mobile containers twice a year at 18 locations. In 2006 alone 26 tons of hazardous waste were collected in mobile containers and 37 tons at the landfill (Snaga, 2007).

18.2. Outstanding environmental problems

Although Ljubljana compared to other European cities of similar size does not rank among the most degraded urban environments, environmental problems nevertheless represent a critical issue (Špes et al., 2002; Plut et al., 2006). Its basin location, poor ventilation, the ecosystemic significance of Ljubljana Marsh, the regional water supply role of the groundwater of Ljubljana Plain, the higher relief of the eastern edge of the UML, and

susceptibility to earthquakes and floods are fundamental natural limits to the spatial development of Ljubljana and self-cleaning capacities. The reduced self-cleaning capacities of the southern part of the Ljubljana and a relatively heavy burdening of the landscape creating elements of the sensitive ecosystem of Ljubljana Plain have a fundamental influence on the high fragility of the geographical environment of Ljubljana and the UML as a whole. Preservation of the crucial ventilation corridors from the edge towards the centre is very important for the Ljubljana Basin, and building along them is not desirable (Jernej, 2000). The preservation of a high-quality and recreationally attractive urban fringe as well as green spaces within the city limits is likewise important.

An environmental analysis of the past and current state and trends during the period from 1990 - 2005 highlights spatially the following most relevant environmental problems of Ljubljana and the UML as a whole (Plut, 2007):

- increase in traffic emissions (nitrogen oxides, benzene) and a high level of noise in many areas of the city core, along major arterials, and the motorway bypass;
- heavy pollution of many of the city's surface water bodies and occasional excessive amounts of toxic substances in the groundwater of Ljubljana Plain that are hazardous to health;
- increase of environmental pressures on the hydrogeographic hinterland for drinking water pumping stations, especially in Ljubljana Plain;
- large quantities of waste, problems dumping it and recycling it, and a large number of illegal waste dumps;
- large ecological footprint per capita (an indicator of overconsumption of natural resources and large quantities of emissions) and excessive emissions of greenhouse gases.

Crucial and still unresolved environmental problems are traffic, wastewater treatment, and solid waste management. Environmental pressures related to road traffic and suburbanization are especially increasing. Characteristic of Ljubljana is a favourable balance between open spaces and built-up areas, which is good for the quality of life and the ecosystem. A particular feature of the urban structure of Ljubljana is the presence of extensive areas that are predominantly natural (in the shape of wedges) practically in the city centre. However, it should be noted that this is relative, since in the city centre and immediate vicinity of some residential blocks of flats there is a small extent of public green spaces, not very many trees in the area of the city, and the patches that do exist are small and dispersed.

In the 1998 - 2007 period the quality of the environment in the UML improved with respect to three forms of environmental pollution: SO₂ pollution, wastewater treatment at the new municipal wastewater treatment plant, and partially also as a result of the partial cleanup and reorganization of the Barje landfill. The state of the environment has remained practically unchanged with respect to ozone and particulate pollution, the groundwater of Ljubljana Plain, soil degradation, and noise in the city. The state of the environment has gotten worse regarding NO_x pollution, smaller watercourses, illegal waste dumps, and threats to the biosphere.

From the standpoint of sustainable spatial development of Ljubljana, the following environmental pressures are fundamental: increases in road traffic, personal consumption and associated municipal waste production, building in the region of groundwater of Ljubljana Plain and unregulated suburbanization processes, especially in the ecosystemically very important Ljubljana Marsh. On average Ljubljana residents have good accessibility to city bus routes but the picture is less favourable with respect to the need for modern and rapid transportation. Reasons for this are to be found in the mentality and behaviour of residents, who still prefer to drive their own cars instead of using public transport, thereby increasing traffic congestion in the city. Despite the acute problem of traffic saturation the number of users of public urban transport is dropping (Špes et al., 2000). Based on an extensive survey in 200, 58 % of all journeys in the territory of the UML were taken by car, 19 % were on foot, 10 % by bicycle, and only 13 % using public transport. In the Ljubljana urban region 73 % of all journeys were made by car, and only 8 % using public transport (Verbič Miklič, 2004).

A key reason for the extensive spatial development of the UML with its multiple negative environmental impacts in recent decades is the extensive, scattered, and frequently unregulated growth of residential and other built up areas in suburban areas. In this way an approximately 25 - kilometre wide suburbanized belt has grown up around Ljubljana since 1970, where a large part of the population live and commute daily to work in the city. Expansion to the south has been especially intense, in the area of the flood- and earthquake- prone Ljubljana Marsh (Gašperič, 2005).

There has also been a large emphasis in the past ten years on the construction of shopping centres and the development of activities outside the traditional transportation corridors, while the development of the city centre and public transport has lagged behind. Intensive land use, an expansion of built-up areas, dispersed or only partially nucleated suburbanization, permeable sewage systems, shopping centres outside the core urban area, warehouses, highway bypasses and associated increased traffic density in Ljubljana Plain increase the risks to the safe and healthy supply of drinking water to Ljubljana.

18.3. Environmental protection guidelines and measures

A basin location, poor ventilation, the ecosystemic significance of Ljubljana Marsh, the regional water supply role of the groundwater of Ljubljana Plain, the higher relief of the eastern edge of the UML, and susceptibility to earthquakes and floods are fundamental natural limits to the spatial development of Ljubljana. The reduced self-cleaning capacities of the landscape creating elements (especially the air and water) of the southern part of the Ljubljana Basin, and the relatively heavy pollution burden on the landscape creating elements of Ljubljana Plain influence the high fragility of the geographical environment of Ljubljana. City policies, especially those relating to urban planning and transportation, are expected to give greater attention to adapting planning to the environmental limits in future.

Protection of the groundwater of Ljubljana Plain and calming of suburbanization processes and road traffic are basic challenges to the sustainability of Ljubljana's urban poli-

cies. A survey of some accessible environmental indicators of the sustainable development of Ljubljana underscores some positive measures for the reduction of urban air pollution (a gas supply network and district heating) and a lagging behind in resolving the traffic problem and partially also in wastewater treatment and solid waste management, which are fundamental environmental curative tasks by 2015. The reduction of the current excessive pressures from gaseous emissions, wastewater, solid waste, and aggressive land use is a sustainable condition for the future planning and environmental capacities adapted to the location of urban activities (Špes et al. 2000; Plut et al. 2006; Plut 2007).

Sustainable (environmental, economic, and social) spatial development of Ljubljana and the UML as a whole should arise from the basic principle of the environmental side, which emphasizes the sustainably more challenging principles of spatial development: the spatial arrangement and use of space should be done within the framework of environmental capacities in the territory of the UML. An environmental analysis and assessment (current state, trends and effects of degradation of the basic elements of the environment) of the spatial development of the UML (with an emphasis on Ljubljana) for the period from 1990 - 2005 shows that environmental pressures of settlement and numerous activities frequently exceeded the self-cleaning capacities, and energy and materials use and per capita ecological footprints were significantly greater than acceptable at the local, national, and planetary levels. Despite this, data show that it is possible with well thought out curative and preventive measures to achieve a higher level of quality of the residential environment and life without exhausting environmental capital, which would make it possible for Ljubljana to become a place with a high quality of life which would represent an advantage compared to other Central European cities.

A locally and regionally integrated tram and railway system is a crucial precondition for redirecting commuters away from the use of private cars and towards the use of public transport and bicycles (Trajnostni razvoj Mestne..., 2002). This would among other things also bring a significant reduction in the production of greenhouse gases and per capita ecological footprint. But solutions to the urban traffic problems of Ljubljana cannot be successful if policies are not planned and coordinated for the whole of the urban region, in which two thirds of all journeys in Slovenia take place. At the same time experience elsewhere in Europe shows that it is not physically and economically possible to ensure sufficient roads for the increasing demands of private motor vehicle use and for calming traffic. It is crucial to implement a program of construction of connections with the main railway routes (Kranj, Kamnik, Litija, Grosuplje, Borovnica) and the development of a regional Park and Ride system for cars and bicycles.

A solution of integrated public transport that would be optimal for the regional environment and settlement network (the model of decentralized concentration in the wider urban region of Ljubljana) appears to be a modern suburban railway system (nearly doubling the number of railway stations). In Ljubljana these could feed into tram lines, and a modern passenger intermodal terminal enabling rapid connections to various other public transport networks (railway, tram, regional bus, city bus, taxis) could be built in the area of the main railway station. In future a railway connection to the airport in Brnik would be appropriate if air traffic increases substantially (there is some uncertainty regarding this due to expected sharp increases in air fares as a result of the contribution of

air travel to climate change). In all likelihood the planning and realization of more modern but less tested forms of public transport would require much more time; from this standpoint and also considering the currently unbearable traffic situation in Ljubljana, this would be a less appropriate solution.

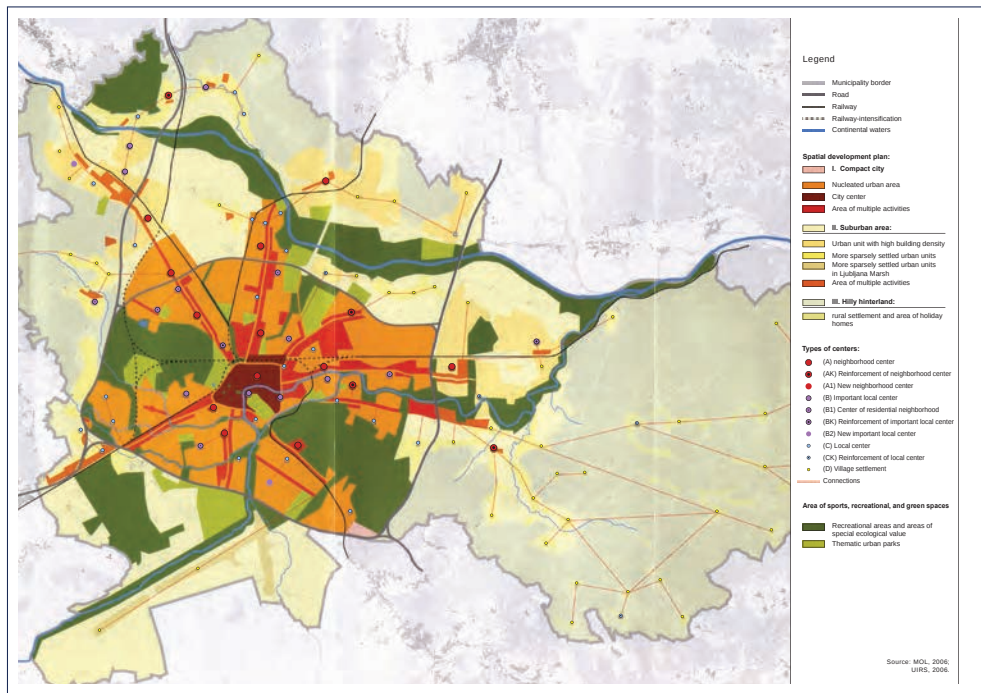
Together with other appropriate policy measures it is possible to achieve the environmentally friendly goal that 20 – 30 % (rather than the current 10 %) of journeys in Ljubljana would be carried out by bicycle. Given the suitable morphology of the city, the relatively favourable climate (in comparison with the bicycle-riding Scandinavian countries), the modest relief (cycling routes which do not have steep ascents and descents), cycling in the UML has all the objective conditions to become the second most common (after public transport), environmentally-friendly (also from the standpoint of reducing greenhouse gases) and healthy form of everyday travel for city residents (especially for distances of 1 – 5 (10) km) by 2015.

The morphological structure of the city and Golovec Hill and Šišenski Hill as relief and green wedges have shaped the extent of the compact city core and the star-shaped layout of the city along seven major urban arterials. For this reason spatial documents justifiably emphasize the importance of the star-shaped development of the city and the expansion of activities from the centre outwards along major routes (public transport and especially city railway lines). The role of locally concentrated areas of building with protected green spaces among them is crucial. The maneuvering space for efficient, sufficiently wide and contiguous ventilation corridors especially in the northern part of the city is being affected by some new construction projects, and at the same time building on agricultural land and on the ecologically sensitive Ljubljana Plain, with its important role in the water supply, is increasing. It will thus be necessary to direct the development of settlement around the edge of the city to the areas of concentration along the projected routes for city transport and to slow down and prevent sprawl and reclaim urban degraded areas for development and public green spaces, which are greatly lacking in many areas of the city centre and tower block residential neighbourhoods. We estimate that the consideration of climatically important areas and the necessity of ventilation corridors from the edge to the city centre are a strategically important sustainable direction for Ljubljana, given its basin location. It is necessary to apply the concept of the compact city, with appropriate urban renewal and reclamation of abandoned and degraded city areas.

In 2007 the Urban Planning Institute of the Republic of Slovenia prepared an updated draft of the Strategic Spatial Plan for the Urban Municipality of Ljubljana (2007) for the period until 2025, which was unanimously accepted by the City Council in 2007, although some modifications were expected. The revised draft is in accordance with the Spatial Vision Ljubljana 2025, and both documents are based on the Spatial Plan for the UML (2002) and the Strategy for Sustainable Development of the UML (2002). They also contain some new projects. In accordance with the demands of modern planning and the principles of sustainable development, the main goals are the improvement of already existing urbanized regions (development inwards, renewal), a shift away from patterns of dispersed settlement and sprawl, enhancement of the social and economic public infrastructure and the rational expansion of settlement. In comparison with the plan for the organization of space in the Spatial Plans (2002), categories of land use are more detailed

as to content (compact city, edge, and hilly hinterland with various categories of land use) on the map of the plan of spatial development of the Strategic Spatial Plan, which from the standpoint of achieving spatial urban sustainability are also more appropriate.

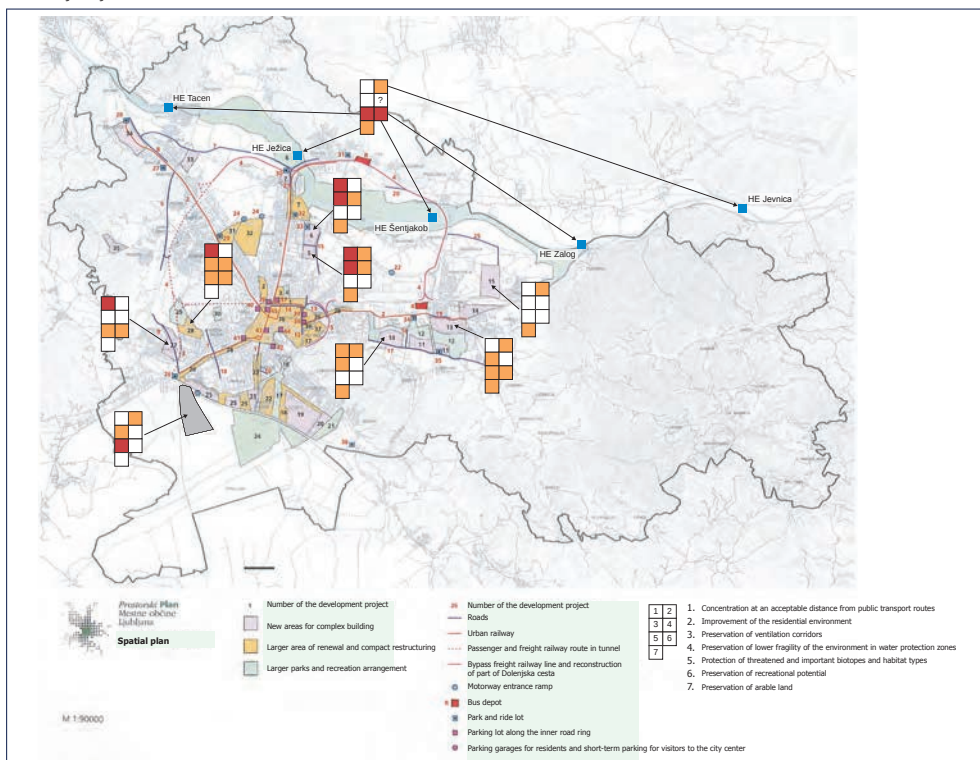
Figure 69: Spatial development plan for the Urban Municipality of Ljubljana.



With respect to the crucial goals, the document mentioned is categorized among spatial acts with weak sustainability: the key emphases are devoted to internal urban renewal, which is supportive of sustainability, but at the same time they still plan an increase in built up areas and correspondingly greater environmental pressures in areas of greater landscape sensitivity. The basic strategic goals of spatial development stem from the goals of the Spatial Plan (2002), and from the environmental standpoint the additional point of departure of (partial) consideration of climate changes and reduction in greenhouse gases is justified. Unfortunately a (radical) restructuring of traffic is no longer among the key strategic goals, and moreover the construction of a new gas-steam station for the Moste thermal power station is planned, which will cause an increase in greenhouse gas emissions. Greater attention is being given to the use of biomass and the placement of photovoltaic panels, especially on public buildings, which is environmentally and energetically appropriate.

There is a justifiably strong emphasis on a system of regional railway routes, the intensification of the railway, a bicycling program and the reorganization of the Passenger Centre of Ljubljana, while the introduction of urban railways is cartographically anticipated as merely a possibility (Strateški prostorski načrt..., 2007). Given the environmental and spatial burden of road transport, the postponement or abandonment of the construction of urban railways (trams) is unacceptable from the standpoint of redirecting settlement and building.

Figure 70: Environmentally controversial projects of the Spatial plans for the Urban Municipality of Ljubljana (2002).



The partial direction of the concentration of development along existing star-shapes along arterials, the use of existing buildings and degraded areas, and the development of settlement in the vicinity of public transport are positive developments; among other things they should contribute to a decrease in the production of greenhouse gases. From the standpoint of preserving environmental potential, greater attention is justifiably being given to the preservation of open spaces and low construction along the prevailing ventilation corridors. In this way air quality should be maintained and the urban heat island effect avoided. However, among other things the construction of new technical faculties and accompanying programs around the Biotechnical centre below Rožnik Hill with connections with technological parks is foreseen, and the area will be connected to public transport. The construction of the Stožice central football stadium (for about 15.000 spectators) will have an impact on an open, ventilated but also partially degraded space, as will the multipurpose sports hall in Stožice (up to about 8000 seats). In contrast to the Spatial Plans (2002) the draft of the Strategic Spatial Plan (2007) mentions the possibility of the incineration of waste as one of the variants for waste management and district heating. The possible location is not cartographically defined, but in the text it is indicated as one among alternative microlocations (TE-TOL, Energetika Ljubljana, Barje). The construction of hydroelectric power stations along the Sava (Tacen, Gameljne or Ježica, Šentjakob and Zalog, and outside the territory of the UML Jevnica), which require comprehensive and multilayered sustainable safety assessments are also anticipated.

18.4. Conclusions

The environmental aspect of sustainable development of Ljubljana is undervalued compared to the economic and social aspects. Key to the future sustainable spatial and regional development is, in addition to an increase in environmental efficiency, a decrease in numerous environmental pressures by means of curative and preventive measures. From the spatial aspect, foremost among preventive measures is a spatial and geographical arrangement of settlement which is optimal from the standpoint of environmental protection and nature conservation and in accordance with varying and usually fairly limited capacities of the environment and natural resources (basin location, groundwater).

For the territory of the UML, the realization of the sustainable principles cited means that the following must be at the forefront:

1. preservation of the environmentally favourable star-shaped layout of the city and green wedges, which enable on the one hand the sustainably optimal organization of public transport and on the other hand a high quality of the residential environment, the quality of sustainable urban life, and appropriate areas of bioproductive and recreational open space with an additional ventilating role;
2. balancing of the density of building and other critical environmental pressures between the more heavily burdened northern and the less heavily burdened southern halves of the urban space of Ljubljana, with denser building along public transport routes;
3. preservation and through protective measures an increase in the all too necessary self-cleaning capacities, the landscape and biotic diversity of the urban and rural ecosystem of the UML;
4. a gradual reduction in the high per capita use of natural resources and production of various emissions in the UML (including the reduction of per capita greenhouse gases) along with the appropriate spatial organization of areas of residence, work, and leisure activities as an important global goal of Slovenia and the European Union.

Our assessment is that the degree of material welfare and simultaneous environmental pressures is at a level which requires sustainable developmental environmental spatial and regional development of Ljubljana as an environmentally responsible European city.

19. Environmental aspects of the planning and development of Belgrade

Dejan Filipović, Danijela Obradović-Arsić

The state of the environment of the city of Belgrade is defined by its natural conditions, originated from urban structure, transportation, economic and other activities.

Presently, the territory of the City of Belgrade with its close surroundings is the most developed industrial zone of the country. In this zone, there are three main chemical industry complexes (Pančevo, Šabac and Barič), intensive surface exploitation of lignite (Lazarevac), energy production (Obrenovac, Veliki Crljeni). At the same time, these complexes are the environmentally most jeopardized areas. Great concentration of population and industry caused pollution of air, water and soil, as well as other impacts to the environment.

19.1. Analysis and estimation of the state of the environment

19.1.1. Air quality

The quality of environmental air in some parts of the City is influenced by the emissions of polluting substances originated from different energetic and industrial processes, traffic, etc., and so the following problems can be mentioned as the major ones of spoiling the quality of air:

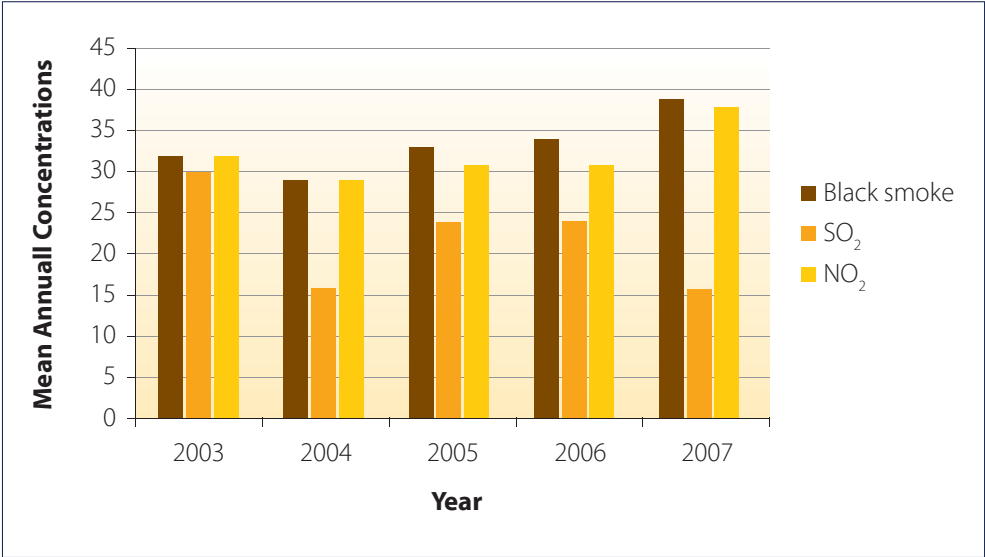
- air pollution in the regions where thermal-energetic and industrial plants are situated (Obrenovac, Lazarevac, inner city core) caused by the emission (SO_2 , NO_x , CO, PAH, aero-sediments, black smoke, etc.);
- air pollution caused by traffic (NO_x , SO_2 , low O_3 , lead, benzene, soot, CO, etc.)⁷⁸;
- high concentrations of soot in the air throughout the heating season due to emission from individual boiler rooms and households.

Based on data obtained by investigating the samples of air from the local network of urban stations⁷⁹ in the period from 2003 to 2007, it can be concluded that the mean annual values of SO_2 , soot and NO_2 are mostly within the limits (Figure 71). However, observed according to daily level, at separate measuring places, large excess occurs occasionally. Therefore, the number of days with excessive imission level value (ELV) is taken as the corresponding index of air pollution (Figure 72).

⁷⁸ Trend of air pollution, originated from traffic (based on the results of air pollution at the crossroads), pointed to the increase in all examined parameters, which was the consequence of the use of fuels of different quality, the use and import of larger number of old vehicles, donations and imports of vehicles used in city public transportation, traffic congestion, the non existence of underground that would reduce the traffic.

⁷⁹ Examination is carried out by the City Public-Health Institute Belgrade and Republic Institute for Public-Health »Dr Milan Jovanovic Batut«.

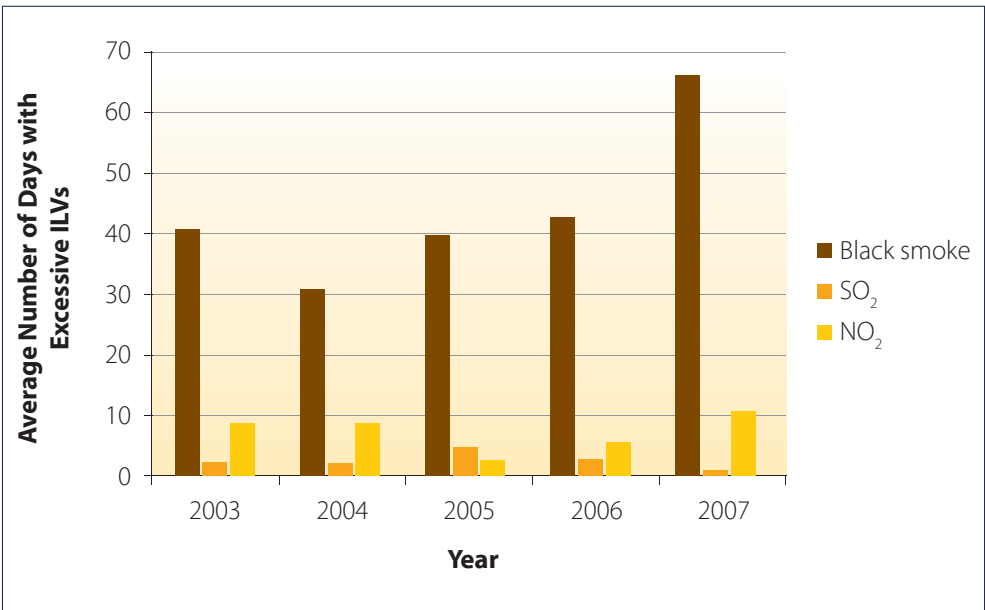
Figure 71: Annual mean black smoke, SO₂ and NO₂ concentrations (µg/m³) in Belgrade (Imission Level Value for black smoke per year: 50 µg/m³, ILV_{SO₂} = 50 µg/m³, ILV_{NO₂} = 60 µg/m³).



Source of data: City Public-Health Institute Belgrade.

Average number of days with excessive ILV is specific for black smoke, and almost during the hole period 2003 – 2007 is over 36.5 days per year (10 % of the measurement period), which is the recomendation of the World Health Organization for allowable excess.

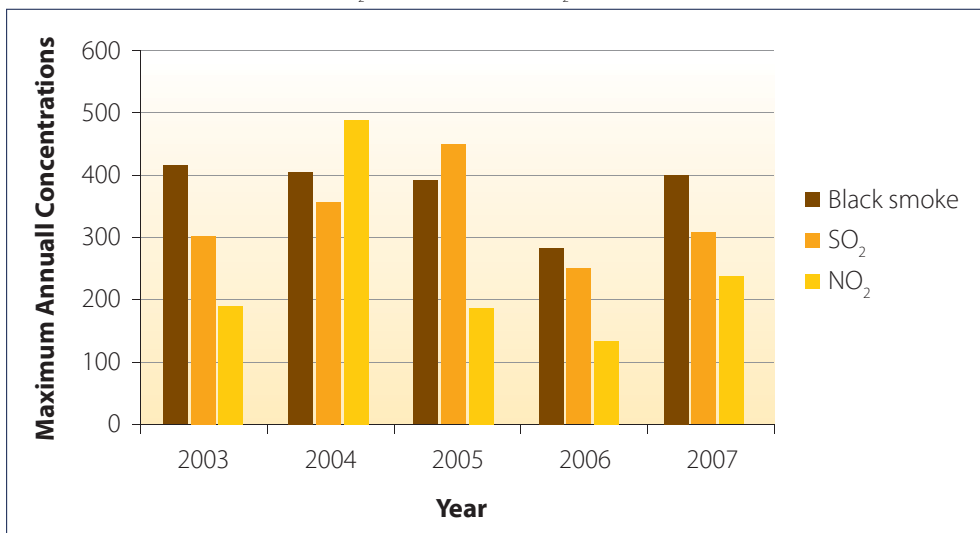
Figure 72: Average number of days with excessive ILVs for black smoke, SO₂ and NO₂ in Belgrade.



Source of data: City Public-Health Institute Belgrade.

The maximum daily concentrations throughout the whole period from 2003 to 2007 were far above the limiting imission values, particularly with black smoke for which even eight times higher values were noted (Figure 73).

Figure 73: Maximum annual concentrations registered in Belgrade, expressed in $\mu\text{g}/\text{m}^3$ (ILV for black smoke per day: $50 \mu\text{g}/\text{m}^3$, ILVd $\text{SO}_2 = 150 \mu\text{g}/\text{m}^3$, ILVd $\text{NO}_2 = 85 \mu\text{g}/\text{m}^3$).



Source of data: City Public-Health Institute Belgrade.

19.1.2. Water quality

The following rivers are included in the monitoring of the quality of surface waters, which is carried out by City Public-Health Institute of Belgrade on the territory of Belgrade: the Sava, the Danube, the Kolubara, the Galovica, the Topcidarska River, the Zeleznicka, the Baricka River, the Pestan, the Turija, the Beljanica, the Lukavica, the Bolecica, the Grocica, the Veliki Lug, the Ralja, as well as the canals of the Pancevacki rit (the Kalovita, the Sibnica, the Vizelj). The control of the quality of surface waters is carried out on the territory of Belgrade for estimating the classes of river waters, following the trend of water pollution, estimating the qualities necessary to self-purification and water supply of Belgrade, Obrenovac, Baric and Vinca, the possibilities of irrigation, as well as for health protection of citizens who use these rivers for recreation. The obtained results served as the basis for the estimation of the efficiency of measures that have been overtaken in reducing the pollution, but also for suggesting new measures of protection.

Surface Waters

The largest number of profiles for measuring the quality of surface waters is on the Sava and the Danube⁸⁰, where the dynamics of sampling is the most frequent. "Makis" on the Sava and "Vinca" on the Danube are the most significant profiles because they are located at the very spring of water supplying.

⁸⁰ Profile on the Sava: village of Usce (62 km), Zabran (30 km), Duboko (24 km), Makis (10 km) and Kapetanija (1 km), on the Danube: Stari Banovci (1193 km), Zemun (1173 km), Bela Stena (1160 km), Vinca (1145 km) and Brestovik (1124 km).

Based on the examinations, carried out in the period from 1998 to 2007, it can be concluded that the water quality of the Sava is little better than the water quality of the Danube, but the difference in the quality between these watercourses is gradually reducing.

Generally observed, the water quality of the Sava was the worst in 2007 in the last decade (Table 57). Since the population number and the inflow of sanitary and industrial waste waters did not change significantly in relation to the previous years, the worsening of the situation can be explained by the phenomenon of new polluters in the basin and the intensive washing filth off the banks after more abundant precipitation. It is significant to mention that the deviations from regulated quality (II class) were mainly towards the III class of river waters⁸¹, as well as that in the Sava river basin, upstream from the spring of Belgrade water supply, there were no damaging pollutions by oil, oil derivatives, hard and toxic metals, pesticides, polychlorinated biphenyls and polycyclic aromatic hydrocarbons.

Table 57: Results of the water quality control for the Sava on the territory of Belgrade, 1998 – 2007.

Year	Total number of examined samples	II class river waters ⁸²		Beyond class II, due to changed parameters (%)					
		No. of samples	%	Bact. and phys./chemical		Only physical/chemical		Only bacteriological	
				No. of samples	%	No. of samples	%	No. of samples	%
1998	53	21	39.6	15	28.3	13	24.5	4	7.5
1999	50	20	40.0	10	20.0	10	20.0	10	20.0
2000	53	26	49.0	9	17.0	7	13.2	11	20.8
2001	64	40	62.5	5	7.8	14	21.9	5	7.8
2002	66	35	53.0	5	7.6	15	22.7	11	16.7
2003	68	24	35.3	11	16.2	7	10.3	26	38.2
2004	68	34	50.0	11	16.2	4	5.9	19	27.9
2005	68	19	27.9	22	32.4	13	19.1	14	20.6
2006	68	22	32.4	20	29.3	4	5.9	22	32.4
2007	60	18	26.5	15	22.1	6	8.8	29	42.6

Source: *Environment in the City of Belgrade, 2008*.

⁸¹ The III class of river waters-waters that can be used for irrigation and in industry, except food-processing industry.

⁸² The II class of river waters (according to Regulation on the classification of waters, »Serbian Official Register«, no. 5/68) are waters suitable for bathing, recreation and water sports, for the breeding of less pure fish, as well as waters that can regularly be used for water supply to settlements and in food-processing industry.

Table 58: Results of the water quality control for the Danube on the territory of Belgrade, 1998 – 2007.

Year	Total number of examined samples	II class river waters ⁵		Beyond class II, due to changed parameters (%)					
		No. of samples	%	Bact. and phys./ chemical		Only physical/ chemical		Only bacterio-logical	
				No. of samples	%	No. of samples	%	No. of samples	%
1998	62	12	19.4	31	50.0	16	25.8	3	4.8
1999	58	14	24.1	29	50.0	8	13.8	7	12.1
2000	62	22	35.5	24	38.7	9	14.5	7	11.3
2001	64	21	32.8	17	26.6	19	29.7	7	10.9
2002	66	26	39.4	14	21.2	10	15.2	16	24.2
2003	67	19	28.4	24	35.8	6	9.0	18	26.8
2004	68	27	39.7	10	14.7	5	7.4	26	38.2
2005	68	13	19.2	26	38.2	9	13.2	20	29.4
2006	68	11	16.2	23	33.8	9	13.2	25	36.8
2007	68	20	29.4	17	25.0	8	11.8	23	33.8

Source: Environment in the City of Belgrade, 2008.

Generally observed, the water quality of the Danube was micro-biologically and physically-chemically considerably better throughout 2007 than 2006 and 2005, but still worse than in 2002 and 2004 (Table 58). This was an average year in the last decade. It is important that worsening of the water quality of the Danube stopped and the stopping should be continued in the following period due to the protection of the water supply springs in Vinca, possibilities for recreation on the Danube and favourable influence on hydrobionts.

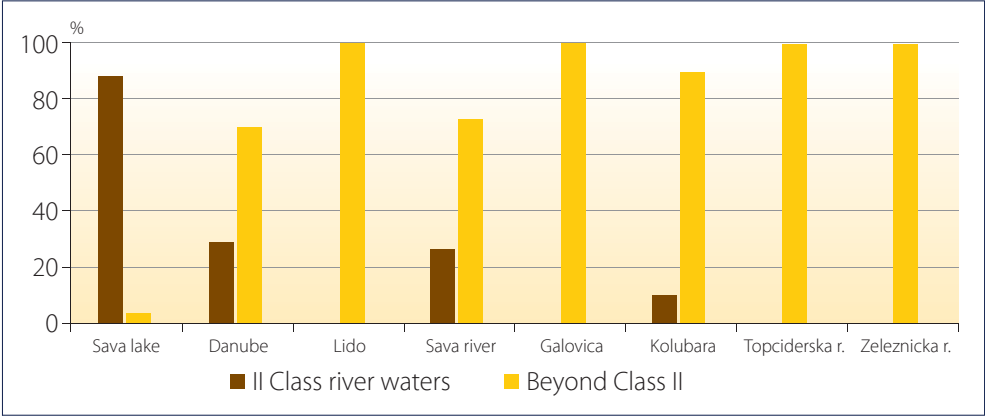
Waters of the Kolubara River most often correspond to the III-II class of the water quality. Waters of many smaller watercourses, and especially those flowing through inhabited places (the Veliki Lug, the Lukavica, the Bolecica, the Grocica, the Topciderska, the Zeleznicka, the Baricka River, as well as canals of the Galovica, the Sibnica and the Kalovita) have constantly been out of the limits of the II class river waters, while very often they belong to the IV class or they are out of all classes of river waters.

Permanently bad water quality of the Galovica canal and the Zeleznicka and the Baricka River influences unfavourably the underground waters at coast, whereas all three watercourses flow through closer zone of the sanitary protection of Belgrade water supply.

Compared with many small watercourses, the Kolubara River, as well as the Sibnica and the Vizelj canals are less polluted, while the samples corresponding to the II class river waters appear occasionally. Among small watercourses, the situation was registered to be relatively satisfying only in the Beljanica and the Ralja rivers, in which about 50 % of analysed samples were within the limits of the II class water quality.

Generally speaking, as the quality of surface waters in the area of Belgrade concerned, the situation is relatively favourable in the Beljanica, the Ralja, the Sava and the Danube, whereas the situation is upsetting in all other controlled watercourses and it is even alarming in the Bolecica, the Lukavica and the Veliki Lug.

Figure 74: Percentage of II class river waters in samples from some surface waters on the territory of Belgrade in 2007.



Source: Statistical yearbook of Belgrade, Institute of Statistics and Informatics, Belgrade, 2008.

The Lake of Ada Ciganlija is not completely maintained as it has been expected by the projects of construction and rebuilding, so the positive effects, achieved by sanitary cleaning of the Lake which was carried out in 1987, are gradually disappearing. Even besides the applied intensive measures of mowing in order to reduce the spread, submersible, macrophyte vegetation and removing the biomass from the Lake for several times throughout 2007, the water quality has still been spoiled, primarily due to constantly large number of bathers, which exceeds ecological capacity of the Lake, i.e. capability of self purification, as well as permanent introducing of new servicing, recreation and other contents in order to enrich the offer. The water quality at bathing beach of Lido is out of the limits of the II class water quality throughout the larger part of the bathing season. The water quality near Avala accumulations is the best on “Duboki potok”, while the water quality of “Bela reka” is little worse, whereas “Pariguz” has the worst quality of water. All three accumulations near Avala show that the processes of eutrophication are very advancing on them.

Underground Waters

The characteristics of the water-table of alluvial deposits of the Sava River are influenced by the quality of surface waters, taking the direct hydraulic link of the river bed into consideration with aquiferous horizon. The significant transformation of the Sava water qual-

ity, during feeding the water tables of Belgrade spring, is characterised in the reduction of both inorganic and organic load. The result is the satisfying quality of the water-table of alluvial deposits of the Sava River on the territory of Belgrade even above the occasional deviations from some parameters (iron, manganese, ammonia). However, relatively large vulnerability of some parts of Belgrade spring has to be considered because of its large lined indentation (length of over 50 km) and collision with urban core. Housing and industrial structures, traffic infrastructure, agricultural activity at the Sava coastline, as well as the fact that there are no corresponding communal systems for water purification in the parts of the urban whole, and especially in rural settlements, influence the degradation of the quality of the aquiferous environment.

Drinking Water

Explaining the results of the examination of waters of Belgrade water supply system for the period from 2003 to 2007, as well as based on the mentioned facts, it can be concluded that the quality of drinking water corresponds to regulated standards from health aspect. The aberration from the physical-chemical correction of water appears in 1.0 – 1.5 % of the samples, whereas bacteriological aberration is in 4.2 – 9.4 % of the samples.

Table 59: Total number of samples and percentage of physical, chemical and bacteriological aberrations in the samples of drinking water taken from The Belgrade Waterworks, 2003 – 2007.

Year	Total number of examined samples	Physical/chemical aberrations		Bacteriological aberrations	
		No. of samples	%	No. of samples	%
2003	6.565	64	1.0	275	4.2
2004	6.579	83	1.3	349	5.3
2005	6.537	100	1.5	420	6.4
2006	6.631	96	1.4	383	5.8
2007	6.628	71	1.1	626	9.4

Source of data: City Public-Health Institute Belgrade.

Physical-chemical aberration is most often the consequence of insignificant increase in the concentration of iron and muddy water, which does not have significance for human health, and it occurs due to change of pressure or lack of water resulted from planned cutting off and the condition of distributive network.

Bacteriological aberration mainly appears in summer period and mostly refers to the increased total number of bacteria (the presence of which is only acceptable in drinking water), which does not have great health significance, but it is important as the indicator of the situation. Therefore, the mentioned parameter is differently standardized, or it is not being standardized in other regulations in the world. It is necessary to emphasize that pathogenic microorganisms have never been isolated.

Waste Waters

The sewerage network is not developed enough in the settlements on the territory of Belgrade. The most significant characteristic of the sewerage system is that around 30 % of urban and suburban settlements are not connected to the public sewerage system. Certain number of streets in the very urban core (municipalities of Vracar, Savski Venac, Palilula, Vozdovac, Zvezdara, Cukarica, Zemun) does not have sewerage. The suburban settlements make special problem, such as Mali Mokri Lug, Kaludjerica, larger part of Batajnica, Krnjaca, Ovca, Vinca, Lestane, as well as large number of unplanned built settlements, which also do not have the sewerage system.

In the city of Belgrade, the total of 137.610.000 m³ of waste waters were discharged in 2004, whereof 100.000.000 m³ were discharged from households. A water purification plant of the City does not exist. The condition in the city sewerage system is extremely hard and it can be described in the following way: Belgrade sewerage system has 24 discharges into the city rivers, the Sava and the Danube, without any previous purification; the largest number of the total of 37 pumping stations of the sewage system is in very bad condition; the unload of tank trucks with drains is not sanitary correctly solved; a water purification plant of Belgrade is planned to be built in Veliko Selo.

19.1.3. Soil quality

Intensive urbanisation, development of industry, traffic and agricultural activities, influence the excessive pollution of the environment and soil. The sources of soil pollution on the territory of Belgrade have dominantly been the consequence of human activities and basically they can be divided into three groups:

- 1) soil pollution originated from waste waters – waste waters from technological procedures in industry and economy; waters polluted due to agricultural activities (artificial fertilizers, pesticides and organic waste of different origin); waste waters from individual households, hotels and restaurants and maintenance of hygiene of settlements;
- 2) soil pollution originated from atmosphere – emission from industrial and technological processes; emission due to combustion of fossil fuels in industrial and energetic plants, individual and local boiler rooms, etc.; emission from motor vehicles which use oil and derivatives; emission from the combustion of different organic substances, biomass, etc.;
- 3) soil pollution originated from uncontrolled and inadequate waste disposal from industry, households, agriculture, etc.

Soil pollution is examined on many locations which are grouped in several zones on the territory of Belgrade: soil in the protection zone of Belgrade water supply, soil within city parks and recreation zones, soil near industrial structures, soil near large traffic routes, soil within agricultural area and soil within communal environment of the urban part of the city.

The results of the examination of soil pollution, which was carried out throughout the period from 2003 to 2007, have pointed out that there are locations in the area of Belgrade in which it primarily came to degradation of the surface layer of soil. In most of the examined samples of soil, either the aberration from standardizations, regulated according to standard scale (Nickel), or the presence of some of polluting substances, which cannot be found in surface layer of soil (organic compounds), were registered. The increased concentration of nickel in most of the examined samples pointed to geological origin, i.e. natural presence of this metal in soil on the territory of the city. The presence of PAH in soil, as in the inner urban area, so in agricultural areas on the periphery of the city, points to widespread distribution and gradual accumulation of this organic polluting substance in soil, which is emitted from the sources of air pollution from the area of the city and wider surroundings. Along the main roads, particularly in the zone of impact of highway, the soil quality is damaged due to traffic, i.e. deposition of polluting substances from exhaust gasses (Pb and PAH). Increased concentrations of heavy metals (Pb, Cu and Zn), mineral oils, PAU and PCB in the samples of soil from the area of the tip of Ada Ciganlija, pointed to anthropogenic influence which is in the connection with the purpose and the way of using of the mentioned area, as well as activities being undertaken within the same. In some samples of soil, the presence of DDT, which has not been conventionally used for several years backwards, pointed to residues of this pesticide with a long half-life period.

The causes of the soil quality degradation on the territory of Belgrade should be found in the low level of communal and housing hygiene, uncontrolled use of agro-chemical means, the lack of infrastructural facilities and installations for water purification and gas emissions, disorder of the communal landfill wastes, etc.

19.1.4. Wastes

The existing system of managing the waste materials in Belgrade means gathering, transportation and waste disposal. The basic method of waste disposal is the disposal on landfills. Communal wastes, which also contain hazardous wastes from households, are most often directly transported on landfills without any previous treatment.

On the territory of 17 Belgrade municipalities, 538.164 tonnes of wastes were gathered throughout 2005. The wastes are disposed on five communal landfills⁸³, whereof most wastes, i.e. of the territory of 11 Belgrade municipalities, are disposed on the landfill in Vinca (Grocka). This landfill has been used since 1977. It represents the largest landfill in Serbia, on which 436.089 tonnes of wastes were disposed in 2005. The impact of this landfill on the environment has not been much documented. There is no systematic monitoring of any possible influence of sources (emissions, control of permeable waters, waste gas, etc.). The use of this location for the future needs of Belgrade is influenced by

⁸³ In Grocka-“Vinca” (65 ha), in Obrenovac-“Vlasko Polje-Grebaca” (10 ha), in Sopot (3 ha), in Lazarevac-“Barosevac” (2 ha) and in Mladenovac – “Vlaska” (2 ha).

its rebuilding and expansion on the total area of 70 ha. The municipalities of Lazarevac, Mladenovac, Obrenovac and Sopot have their own landfills which do not satisfy even the minimum of the technical conditions for sanitary landfills.

The information system on the flows of wastes does not exist. Disregarding the legal obligation, the precise evidence about hazardous and harmful substances in Belgrade does not exist. The incineration plants for waste do not exist, as well as for mechanical or biological treatment of communal waste. Moreover, the approved location for hazardous waste disposal does not exist in Serbia, neither a plant for the treatment of hazardous waste. Hazardous waste is temporally disposed in unsuitable warehouses (some of them have existed for many decades) near enterprises. Irregular managing the medical wastes represents significant problem of Belgrade. Considering that the sorting of wastes does not exist in the health-care facilities, the medical waste, including used needles and syringes, waste from surgeries, etc., is ending up in containers, wherefrom it is gathered and transported on the landfill by "City Sanitation Department". The degree of recycling is insufficient, i.e. the treatment of waste. There are recycling yards (containers marked for different kinds of waste) in Ada Huja and New Belgrade.

The following problems are being imposed as the basic ones in this field: poor organisation of the existing communal landfills, the capacities of landfills are full, the existing degree of recycling is insufficient, large number of "wild" landfills are still present, etc. The overall influence on the environment is characterised in the following: pollution of surface and underground waters and soil by permeable waters, uncontrolled emission of methane, degradation of area by wild landfills, pollution of soil, water and air by inappropriate treatment of special flows of waste (waste oils, old vehicles, electronic waste, electric batteries, asbestos, fluorescent pipes, etc.).

19.1.5. Noise

The level of noise has been followed for almost more than 30 years in Belgrade. In 1984, the zoning of the city from the aspect of noise was carried out only in five municipalities. By the time, the number of measuring places increased on 30 in the period from 2003 to 2007.

The levels of communal noise, registered in the period from 2003 to 2007, were both high during the day and night and they exceeded the regulated values in 25 measuring places. In dependence on the zone of purpose, the maximum noise limit exceeding was up to 15 dB (A) (2003, 2006 and 2007) throughout the day, while even 23 dB (A) was registered in the night period of 2003. On average, the largest noise level limit exceeding was in the zone of the urban centre and near mentioned traffic routes, as well as in residential zones.

Communal noise in Belgrade mainly originated from traffic, while industry, small businesses, civil engineering and other activities are of less significance.

The most frequent causes of problem refer to old vehicles with high noise emissions and old production technologies, inadequate location of industrial plants, workshops, and particularly catering establishments situated in urban zones, as well as non implementation of measures of protection.

19.1.6. Risks from Chemical Accidents

According to the number of processed industrial plants, Belgrade does not represent industrial centre. However, as the largest urban agglomeration, it represents large vulnerable zone, as from the aspect of endangerment of human health, so the environment.

There are many industrial plants on the territory of the city of Belgrade which use, store or produce hazardous substances. There were 69 identified hazardous industrial plants, divided into six groups of different degree of risk⁸⁴. The following industries are included in the most risky ones:

1. Industrial complex "Prva iskra"-Baric;
2. Paint and varnishes industry "Duga"-Palilula;
3. Oil refinery "Belgrade"-the Pancevo road;
4. Production of technical gases "Tehnogas"-Rakovica;
5. Store of oil and petroleum products "Jugopetrol-Belgrade"-Cukarica;
6. Pharmaceutical-chemical industry "Galenika"-Zemun (Figure 75).

Figure 75: Map of risky industrial plants in the area of Belgrade.



Source: Ecological Atlas of Belgrade.

⁸⁴ Regional spatial plan of administrative area of Belgrade

The following causes are mentioned as the most frequent ones for accidental pollutions: inappropriate storage of chemicals and hazardous waste, insufficient security of the transportation of chemicals and hazardous waste, old industrial technologies and means of transportation, as well as poor implementation of the measures of prevention.

Hazardous industries which produce, use and store dangerous substances (estimated quantity of around 1.250.000 tonnes per year, whereof 15.000 tonnes of hazardous waste) represent the primary problem of Belgrade and bear high degree of risk to human health and environment (Filipovic and Obradovic, 2004).

In the area of the City, chemical accidents most often occur during transport of hazardous substances, carried out by highway, railroad and river transportation. The risk, originated from highway transportation of dangerous substances, will considerably be reduced by finishing the Ostruznica Bridge and putting the roundabout way into function (Filipovic, 2000).

19.2. Problems of endangerment of the City of Belgrade environment

Based on the existing situation of the environment, it can be concluded that the priority problems of the city of Belgrade are the following:

- very polluted air and raised level of noise in the central zones of the City (bad organisation of traffic, non existence of roundabout and the use of fuel with addition of lead, insufficiently competitive public transport);
- inadequate managing the waste (non existence of sanitary landfill, low degree of recycling, inadequate treatment with hazardous and medical waste);
- inadequate protection of the environment near thermo-energetic structures (lack of re-cultivation of the strip mines of the Kolubara basin);
- degradation of soil due to illegal building;
- soil pollution influenced by waste waters and waste material;
- location of some industries in the central parts of the city core;
- river pollution influenced by the discharge of non purified water from sewerage network;
- irrational use of natural resources, water and energy, particularly;
- existence of risky plants and risk from accidents during transportation of hazardous substances in the central zones of Belgrade;
- lack of forestation;
- lack of permanent monitoring of parameters of the quality of the environment.

The main problems of the environment in Belgrade are the following: irrational use of resources (soil, water, energy, etc.), increase of traffic problems, lagging behind the development of communal infrastructure, degradation and pollution of soil, air pollution and water pollution, risks from natural disasters and industrial accidents, ruining the natural and cultural wealth, as well as insufficient care for aesthetic values of the city. The state

of the environment in Belgrade shows that the strengthening of activities is necessary in certain segments in order to reduce pollution. The influence of some urban functions on the environment is shown in Table 60.

Table 60: Influence of urban functions on the pollution of the environment.

	CAUSES OF POLLUTION	FACILITIES AND ENTERPRISES	EFFECTS ON THE ENVIRONMENT
1.	TRAFFIC		
1.	Highway (city and transit)	registered 2500 vehicles of over 5 tonnes, 1500 buses, CPT+ Lasta (city+suburb. 1870 buses); transit – unknown	Pollution of air and soil, increased noise, accidents with dangerous freights, land occupation
	Bus stations, Public garages, parking lots	BBS + LASTA (1400 departures daily), Parking service (6500 lots on the streets, 5500 on parking lots, 2660 in the garages)	Air pollution, increased noise, water pollution, wastes
2	Railroad stations and Rail traffic	4 intercity stations, 20 stations for city and suburb.traffic, 15 freight stations with 85 ind. platforms	Increased noise, water pollution, land occupation Soil pollution
3	Air	Airports of Belgrade and Batajnica	Land occupation, noise, air, water and soil pollution
4	River	Belgrade Port-120 ha, 700 vessels-510.000 tonnes of capacity	Occupation of land and water surfaces, water and soil pollution
2.	CONCENTRATED POLLUTERS		
1	Industry	energetics – 56.3%, food processing – 14.4%, metal – 10.2%, and pharmaceutical-chemical complex – 6.3%.	Pollution of air, water and soil, industrial waste, hazardous waste, risk from industrial accidents
2	Heating plants and larger boiler rooms	System of “Belgrade generating stations”, with 14 heating plants and 118 heating sources, capacity of 2445 MW and 3400 substations, heats over 220000 apartments and 7500 business facilities	Air pollution
3	WATER SUPPLY AND SEWERAGE		
1	Water supply	Plants of Makis, Banovo brdo, Bezanijska, Belevode and Vinča	Insufficient water in summer months, losses in network, water quality
2	Sewerage	24 discharges from sewage network into the rivers without purification, numerous uncontrolled discharges	Carrying away into watercourses without purification, septic tanks – permeable or they pour out
4.	HOUSING	To the 2000 inclusive, about 426500 apartments, illegal building in 10 municipalities: 22691, weekend houses 1376, auxiliary and other buildings 32731 (the total of 56798).	irrational land use, irrational consumption of energy and water, bad managing the waste and fecal waters, air pollution
5.	MANAGING HARD WASTE	Landfill of Vinča and many trash dumps. “city Sanitation Department” gathers and dispose daily around 1200 tonnes of garbage. The total area of the landfill of Vinča is 65 hectares.	Pollution of soil, water and air due to inadequate gathering, treatment and waste disposal
6	DISPERSED POLLUTERS		
1	Agriculture	49 public sector enterprises: 17 agricultural enterprises, 25 enterprises of food-processing industry, 5 enterprises of beverage industry and 2 enterprises of fodder industry.	Pollution of soil, water and air by pesticides and artificial fertilizers, hard waste, waste waters
2	Petrol stations	135 public petrol stations and approximately the same number of internal ones	Pollution of air, water and soil, increased noise
3	Chemical workshops	Unknown.	Pollution of air, water and soil
4	Storages of chemical and fuels	Unknown	Risk from chemical accident, soil pollution
5	Individual home heating	Unknown	Air pollution, hard waste

Source: Ecological Atlas of Belgrade.

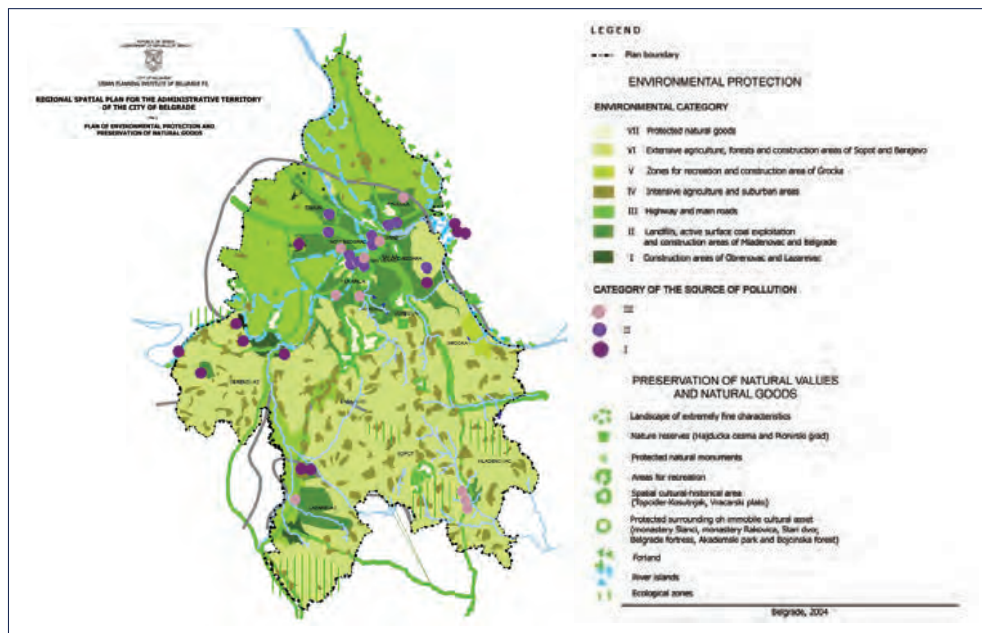
19.3. Valorisation of the environment on the territory of the City of Belgrade

Environmental pollution has been noted in almost the whole territory of the city of Belgrade. The level of pollution and other adverse impacts are not distributed equally, but depend on natural conditions and human factor. Environmental categorization of the City of Belgrade according to the level of pollution indicates to the presence of seven categories of the endangered state of the quality of the environment.

- I category – the area of thermo-energetic plants, mines and disposals of ashes and dross in Obrenovac and Lazarevac;
- II category – central area of Belgrade, Mladenovac;
- III category – belts along highways and main railroad tracks;
- IV category – settlements in edged belt of Belgrade;
- V category – Grocka;
- VI category – Barajevo, Sopot; and
- VII category – unsettled areas without source of the pollution.

The areas within the first four categories generally represent limitations for environmentally sustainable development of the area. On the other hand, an environmentally responsible use of space in the territories belonging to categories V, VI and VII represent a significant potential.

Figure 76: Categorisation of the environment on the territory of the city of Belgrade.



Adapted from Regional spatial plan of administrative area of Belgrade, 2004.

19.4. General and special goals, strategic determinations of the protection of the environment

The key priority of the future development of the city of Belgrade is achieving the rational organisation, use and arrangement of the area in accordance with the preservation of the existing natural values and protection of the environment. This goal is possible to be realised only by the coordination of the potentials and limitations in managing the natural and created values of the area.

The restoration and improvement of degraded environment has to be the main goal of the planning and developing the city of Belgrade, as well as recycling the building land and activating the brown-field locations, i.e. the preventive protection from all planned activities that could endanger the existing quality of the environment.

Therefore, it should be leant towards the following principles in the spatial organisation:

- keep and protect naturally valuable and preserved ecosystems, as well as areas at which the quality of the environment is insignificantly endangered;
- determine the most adequate way of using the natural resources and space with the aim of preserving the natural values and improving the environment;
- reserve and protect the areas which must not be polluted and destroyed for strategic reasons (spring of water supply, protective belts, protected natural wealth);
- recover and revitalize degraded and endangered ecosystems and stabilize the consequences of the pollution. This primarily and urgently refers to mining-energetic zone which includes Obrenovac and Lazarevac municipalities, as well as Ub and Lajkovac.

Concerning the stabilization and revitalization of degraded environment, it is necessary to determine the priority activities, consider all aspects of problem solving, and choose those solutions which give the long-term positive effects. The mentioned priorities are especially significant in urban centres:

- in Belgrade, as urban system of the largest complexity and activity (traffic, industry, communal activities, etc.);
- in Obrenovac municipality, with extreme problems in energetics (thermal power station A and B), in the relationship to the Sava River, as well as in traffic, industry and agricultural land;
- in Lazarevac municipality, with extreme problems of energetic resources of the strategic significance for the Republic and many ecological and social problems;
- in Mladenovac municipality, the problems are extreme in industry and hydro-technical systems;
- in Grocka municipality, there are problems with hydro-technical systems, the relationship towards the Danube, agricultural and building land and central communal waste landfill.

Strategic determinations in the field of the protection of the environment refer to the following:

- providing the qualitative environment, which means fresh air, sufficient amounts of qualitative and hygienically correct drinking water, preservation of agricultural land, ecosystems and biological diversity, qualitative areas for recreation and tourism, healthy safe food, arranged settlements;
- achieving the rational organisation, arrangement and protection of area by the co-ordination of its use with the possibilities and limitations in managing the natural resources (agricultural land, forests, waters, etc.) and created values;
- holding up further degradation of the environment (air, water, soil, etc.) by defining the state, priority of the protection and conditions of the sustainable use of space; and
- overtaking adequate measures of prevention with the establishing of the systems of control of all forms of pollution.

19.5. Determinations of the environment according to activities

The general goal of the development of the city of Belgrade imposes better use of the potentials, with the estimation of demands for conservation and protection of the environment, modernization of economy with the parallel development of social and communal activities and the following services. The strategic determinations of the development, i.e. carrying out of the set general goal, mean the following:

- concentrate industrial production and storages within industrial zone, with more economic land use and special protection of the environment from possible pollution. All planned new economic structures, as potential polluters, have to satisfy the level of the quality of the environment according to corresponding standards and regulated scale of norms. It is necessary to install modern technology in all new production plants by which the harmful activity would be reduced, i.e. which contain technical-technological solutions for minimizing the emission of polluting substances into the environment. Under the issuing of the conditions, all necessary agreements have to be provided and estimations of the influence of the projects on the environment have to be done;
- protection and arrangement of agricultural land according to modern principles of the sustainable agriculture and standardized scope and way of use of agricultural land with natural conditions and limitations of the local milieu represent the basic goal of the protection of the environment when it is agriculture about. In order to realise this goal, it is necessary to initiate the revitalization of agricultural production on modern organizational and technological principles, strictly ecologically controlled;
- development of tourism should be based on natural predispositions of the area of the City, but it must not endanger the ecologically balanced wholes or the qualities of the natural area. This especially refers to protected natural resources and their

direct surroundings, in which only ecologically based forms of tourism can be organised and popularized;

- developed and modern traffic infrastructure that would enable undisturbed local economic development, give qualitative life of the population and estimation of the basic ecological standards concerning projecting, construction and exploitation of traffic infrastructure;
- protection of space and drainage basins of surface waters, protection of underground waters as well as lakes on the level of the highest ecological quality, is the basic goal of the use and protection of waters for the development of waterpower engineering. The ecological pretensions of the area demand high degree of gathering and discharging of waste waters, which means the construction of the system that would enable high quality of the environment, especially in the parts of more intensive use;
- development of some segments of communal infrastructure on the regional and local level, and with the aim of preservation and protection of the environment, means to provide the corresponding system of gathering and disposing the waste, gathering and recycling the raw materials, the system of remote heating and the system of gathering, processing and discharging the waste waters;
- development and improvement of forestry in the area of the City should confirm the high ecological-economical identity of forests, taking into consideration relatively small areas under forests. The protection, distribution and use of forest areas will be carried out over the improving of the existing states of forests, more adequate protection and care, as well as by increasing the areas under forests by planting the species of autochthonous characteristics.

19.6. Priority measures in the protection of the environment

The problem of the protection of the environment has to be integrated in the plans of the future development of the City, so with that aim, the following priorities in the protection and advancement of the environment are defined:

- stabilization of the condition of the most endangered areas-hot spots;
- strict protection and control of springs of water supply;
- adequate carrying out of the primary purification of the communal and industrial waste waters, including the reconstruction of the existing ones and installing the new water purification plants;
- soil conservation, especially the high quality one, from all kinds of pollution (excessive use of agrochemical means, unplanned construction, permeable waters, etc.);
- reduction of excessive level of noise to acceptable limit;
- solving the problems of waste disposal, including the existing landfill in Vinca, as well as transferring to the new system of managing the waste in accordance with "National Strategy of Waste Management";

- stabilization of the existing landfills and trash dumps on the territory of the City;
- strict protection and control of protected natural resources with the aim of their preservation and improvement;
- integral management of the system of green fields (improvement of the structure, enlargement of areas, connecting green areas in the settlement with the greenness of the surroundings and making protection belts of greenness);
- making cadastre of sources of the pollution of the environment in the area of all municipalities of the City of Belgrade as the first phase in the making of information system on the environment;
- establishing systematic monitoring of the quality of the environment in all municipalities;
- establishing active regional cooperation with the adjoining municipalities of the metropolitan area of Belgrade and municipalities in the surroundings with the aim of solving the actual ecological problems and protection of the space and environment.

19.7. Conclusions

The state of the environment of Belgrade is determined by its natural conditions, created urban structure, traffic, economic and other activities which are developing in the city. The care for the quality of the environment has already been accepted as the process of the synthesis of all activities in the urban system of Belgrade. Belgrade decided to respect the principles of the sustainable development, by which it emphasized its intention to join the association of healthy cities by the project "Belgrade – healthy city".

The strategy of the sustainable development of the City should provide a wide framework for integrating the aspects of the protection of the environment into all other sub-systems of the City, starting from the land purpose, over land and housing policy, the planning of advancement of traffic, managing the waters, energy and wastes, etc. An active policy of preventive protection of the environment is established under the making and carrying out of the plans, meaning the estimation of ecological efficiency of all planned solutions, programmes and activities, which is not just a condition for the improvement of the quality of life, but also the significant factor which supports the economic development.

Very high expenses of cleaning the polluted environment and irretrievably disappeared ecosystems should encourage the reduction of the pollution and the natural resources consumption. Conservation, good management, public-private partnerships in giving services, locating industries where the endangerment of the environment will be the least, encouraging the use of less polluting technologies, introducing the encouraging measures and standards for the improvement of the technological efficiency-these are the ways for the City to carry out the long-term goals of growth, sustainable for the environment.

20. The role of strategic planning in development of Ljubljana

Nataša Pichler-Milanović

From 1918 - 1991 Ljubljana was the principal city of the Socialist Republic of Slovenia, the most economically developed republic in the former Yugoslavia. Due to polycentric development policies in 1970s and 1980s Ljubljana developed as a medium-size city contrary to Belgrade and Zagreb.⁸⁵ In year 1991 Ljubljana became the **capital city** of independent Slovenia and in 2004 one of the EU capital cities. Since the end of 1990s Ljubljana has been one of the most competitive cities in Central and Eastern Europe, without entering the process of more intensive city internationalisation, until the accession to the EU in year 2004. As a result of successful macro-economic policies and comprehensive and relatively well coordinated sectoral policies by the Government of Republic of Slovenia (1992 - 2004) - the Urban Municipality of Ljubljana (NUTS 5) and Ljubljana urban region (NUTS 3) became the most important location of economic activities in Slovenia, with relatively high economic and social cohesion, and quality of life of local citizens.

But urban planning and strategic urban development was neglected since 1991 because of the priorities of macro-economic reforms, and the connotation of such planning with the former socialist regime. Market forces, not planning prevailed until the end of 1990s, when the need for planning regulation was recognised to control and direct the spatial development of the Urban Municipality of Ljubljana and Ljubljana urban region.

20.1. "Capital city" formation and internationalisation of Ljubljana

Ljubljana became the capital city in year 1991 after independence of the Republic of Slovenia from the Yugoslav Federation. This was an important "trigger" for the capital city formation and internationalisation of Ljubljana. The process of city internationalisation and integration into the world economy has been reinforced since 1992, not only through economic links (i.e. trade (re)orientation towards EU countries, FDI, privatisation and or take-overs, tourism and cultural links), but also through memberships, links and co-operations of Slovenia within global networks, European organisations and institutions (e.g. EU, European Council, WEU, EBRD, etc.) and regional and cross-border associations (e.g. CEFTA, Alps-Adriatic Working Community, SECI, Pact of Stability for South-East Europe etc.), including different sectoral links and networks with professional association and individuals. The other impact of internationalisation is the development in transport infrastructure (motorways, ports, railway) and telecommunications, transnational intercity flights, and the importance of the information society (e.g. commerce, banking, governance, etc) (Pichler-Milanović, 2002, 2005a).

⁸⁵ According to the results of the ESPON 1.1.1 study (2004) Slovenia is the most polycentric country in Europe despite the small size of Slovenia (www.espon.eu).

The most visible form of Ljubljana's capital city formation and city internationalisation can be seen in establishment of new ministries and government offices, foreign embassies, consulates, representatives of international organisations and foreign companies, foreign tourists and visitors. At the end of 1990s Ljubljana became one of the most competitive cities in Central and Eastern Europe, without entering the process of more intensive internationalisation (i.e. city's exports, FDI, foreign tourists, etc) until the accession to the EU (Pichler-Milanović, 2002; 2005a, 2005b, 2006).

Traditional **twinning** links from 1970s and 1980s between the city of Ljubljana and Bratislava (Slovakia), Chengdu (China), Parma and Pesaro (Italy), Tbilisi (Georgia), Chemnitz (East Germany), Leverkusen and Wiesbaden (Germany), or cities in the former Yugoslavia, have been reinforced since year 2000 with links with other capital cities in Europe. The EU membership of Slovenia in year 2004 has further reinforced the position and role of Ljubljana as one of the EU capital cities in different European urban networks, and strengthening of the role of Ljubljana vis-à-vis other nearby cities in the cross-border Alps-Adriatic region, especially towards Zagreb, the capital of Croatia, Trieste (Italy) and Graz (Austria) (Pichler-Milanović, 2002, 2005a, 2005b). Ljubljana is also a member of international urban networks and organisations such as Eurocities, WHO Healthy Cities, Civitas, Les Rencontres, Global Cities Dialogue, CLRAE, etc. Since 1997 Slovenia has been eligible to participate in different EU programmes (e.g. FP, INTERREG, ESPON, URBACT, INTERACT, etc.) where Ljubljana was selected as a preferable case study city from Slovenia. Participation in these links and networks occurred due to active role of academics, researchers, civil servants, non-profit organisations from Ljubljana in international associations, networks, and organisations. Therefore until year 2001 the city internationalisation developed as a result of internationalisation of the new state of Slovenia, and cooperation and participation of public and private institutions, companies, social groups and individuals in different links, networks and associations - and not as a result of an explicit strategy for internationalisation of the city of Ljubljana (Pichler-Milanović, 2002; 2010a; 2010b).

In year 2001 the Centre for Tourism was established at the Urban Municipality of Ljubljana and the first Strategy for development of tourism with actions plans and programmes (2001 - 2004) was approved enhancing the role of Ljubljana as the capital city of Slovenia. In year 2005 partnership agreement was signed between the Centre for Tourism in Ljubljana and the Ministry of the Economy of RS for coordinated promotion of Ljubljana at the local and (inter)national levels. As a result of these activities the Strategy for development of tourism in the Ljubljana 2007 - 2013 was approved in 2006 that is known as the official "city marketing strategy". As a result the number of overnight visitors in Ljubljana has increased from 200.000 (2001) to 350.000 (2006). In year 2006 most tourists came from UK, Italy, Germany, USA, Austria, France, Croatia, Serbia and Montenegro, Spain. Most foreign visitors come to Ljubljana for business meetings, conferences, summer festivals, weekends, and holidays (www.ljubljana.si). Ljubljana is easily accessible by motorways from Austria, Germany, Italy, Croatia or by air. Since 1992 international airport near Ljubljana has developed many inter-city direct links with scheduled, and charter flights, mainly to other European cities. Ljubljana became the hub for the South-east European countries, but direct airlinks are still missing with some capital cities in the EU. Most frequent flights are to Brussels, Munchen, Frankfurt, Vienna, and Paris (www.lju-airport.si).

During the Slovenian presidency of the EU in the first half of year 2008, the city of Lju-

ljubljana also staged some cultural, scientific and meeting events. But the most important activities and official meetings were held at the new international conference centre Brdo near the town of Kranj, located near the international airport, 30 km north from Ljubljana. Therefore the internationalisation of Ljubljana was not on the policy agenda until the year 2007, when it was explicitly stated in the new urban development strategy of Ljubljana. The city internationalisation was somehow in the shadow of the capital city formation and different interests of the Government of Slovenia, ruling political parties, or individual economic sectors or investors. The Urban Municipality of Ljubljana has also prepared two publications »Ljubljana – where the Europe meets« and »Ljubljana 2025«: the capital city in dialogue with creative people, urban and natural environment, and the future«, as a city promotion and marketing activity for tourists, foreign residents, and students, visiting and/or living in Ljubljana (Pichler-Milanović, 2010b).

20.2. Local government reforms: Establishment of the Urban Municipality of Ljubljana (NUTS 5) and Ljubljana urban region (NUTS 3)

Ljubljana is the largest urban settlement and a town in Slovenia with approx. 250.000 inhabitants. Despite being the largest city in Slovenia, Ljubljana contains only about 15 % of the total Slovenian population. This relatively low primacy rate of Ljubljana is directly related with the specificities of the urban and settlement system and polycentric development policies in Slovenia from the end of 1960s onwards (see Figures 17 and 36) not favouring the growth of Ljubljana, as was the case in Zagreb and Belgrade.

In December 1994 new Local Self-Government Reform Act has changed the local administrative division of Slovenia - from 62 communes to 147-192-193-210-211 municipalities (NUTS 5) by year 2010 of which only 11 are urban municipalities. At the same time the state (re)created 58 local administrative (NUTS 4) units, equivalent to previous communes (NUTS 5), with the exception of Ljubljana (former five communes) that become one NUTS 4 unit after year 1994.

From 1955 - 1994 the city (agglomeration) of Ljubljana was administratively divided into **five communes**: Center, Bežigrad, Šiška, Moste-Polje and Vič-Rudnik. In 1991 the territory of Ljubljana agglomeration (five communes) comprised of 902 square km and 321.607 inhabitants (density of 356 inhabitants per square km) - which expressed the diversity of city's geographic location and morphological form. Division of the city into five communes was made in the context of decentralisation (i.e. self-management) reforms to achieve 'even' redistribution of resources (e.g. services, housing, industrial investments, etc.) despite disadvantages for urban planning and management.

Therefore the local government reforms in late 1994 transformed the city of Ljubljana administratively and spatially. The official city territory was reduced from 902 to 272 km². The administrative division of the agglomeration into five communes was abolished with establishment of the **Urban Municipality of Ljubljana** and 9 surrounding small municipalities: Brezovica, Dobrova-Horjul-Polhov Gradec, Dol pri Ljubljani, Ig, Medvode, Škofljica, Velike Lašče and Vodice, with their own mayors and municipal councils (Pichler-Milanović, 2005a).

In 1995 the Urban Municipality of Ljubljana became the largest local authority in Slovenia. The democratic local elections (1994, 1998, 2002, 2006, 2010) brought directly elected mayors and city municipal councils. The first elected mayor was dr. Dimitrij Rupel (Liberal Democracy of Slovenia, 1994 - 1998), followed by Mrs. Viktorija Potočnik (Liberal Democracy of Slovenia, 1998 - 2002), Mrs. Danica Simšič (Social Democrats, 2002 - 2006), and Mr. Zoran Janković (independent list 2006 – 2010, and since 2010). Current Mayor of Ljubljana, Mr Zoran Janković obtained 65 % of the electorate in October 2006, as an independent candidate from the List of Zoran Janković, consisting of well known people from all spheres of public life in Ljubljana, such as scientists, lawyers, doctors, sport, culture and media people, who represents the majority in the City Council. In October 2010 at the local elections in Slovenia, the Mayor of Ljubljana Mr Zoran Janković was re-elected with majority of votes and more than half of the City Council members come from the List of Zoran Janković (www.ljubljana.si). The Urban Municipality of Ljubljana has directly elected Mayor (with four deputy mayors appointed by the Mayor), the City Council (45 directly elected local politicians), City Management Authority (with more than 20 different departments and offices), 17 local city districts, and other legislative, management or advisory bodies (www.ljubljana.si).

Until year 2010 no regional NUTS 3 administrative provinces has been established as yet in Slovenia, due to long-term professional and political debates about the number and size of administrative regions (provinces). For data collection and analytical purposes 12 statistical NUTS 3 regions (known in 1980 as geographical or planning regions) have been used since 1995. These 12 statistical NUTS 3 regions are also used in regional policy and programming documents known as development regions until the process of regionalisation is completed in the future. From January 2008 there are also two NUTS 2 European cohesion regions – more developed West Slovenia NUTS 2 region and less developed East Slovenia NUTS 2 region, but without political representations. Ljubljana urban region (NUTS 3) is a part of West Slovenia NUTS 2 region (see chapter 5).

Therefore the jurisdiction and territory of the city of Ljubljana is different now than in it was before year 1994. Ljubljana is the capital city of Slovenia as the EU member state, the most important and the largest urban municipality in Slovenia. But the urban agglomeration, urban region or functional urban area of Ljubljana is much larger than the Urban Municipality of Ljubljana. Due to lack of administrative regions (provinces) in Slovenia, the cooperation between the Urban Municipality of Ljubljana and 26 other municipalities in Ljubljana urban region is not sufficient for effective implementation of different strategies, operational programmes and projects being formulated at the (inter)national, regional or (inter)municipal level.

20.3. Towards fully-fledged EU membership - macro-economic and regional policies

After independence in 1991 Slovenia regained the economic development level from year 1990 only in year 1994. Since 1994 economic and institutional reforms in Slovenia have been under direct influence of EU recommendations for achieving Maastricht convergence criteria (1992), improved export competitiveness, and harmonisation of legislation,

standards, norms and policies, as necessary requirements for fully-fledged membership of the EU in year 2004. According to the Accession Partnership signed between Slovenia and the EU in year 1997, harmonisation of legislation was the most important policy activity of the pre-accession strategy of Slovenia, taking place according to the National Programme of the Republic of Slovenia for the Adoption of the *Acquis Communautaire* (1998).

The first **strategic development document** at the national level which had have a top-down influence on the development of the city of Ljubljana and urban region became the Strategy for the Economic Development of Slovenia: Approaching Europe - Growth, Competitiveness and Integration (1995), as a strategic national document that sets out the factors of economic development, long-term goals, development scenarios, and the main guidelines for the state activities in particular areas. The strategy took into account social, spatial, environmental, regional, sectoral and other potentials, limitations and conditions. It defined long-term objectives of economic development and accession to EU, and the role of regional policy for successful implementation of sustainable development. From 1995 - 2000 **sectoral development programmes and strategies** with different impact on regional and local development were also adopted. National Development Programme of Republic of Slovenia (NDP) was adopted in 2001 together with the new Strategy of Economic Development of RS and the Strategy of Regional Development of RS. In the pre-accession period the NDP was an annex to the National Programme for the Adoption of the *Acquis Communautaire*, and a programme basis drawing financial resources from different forms of pre-accession aids in accordance with the priorities of Accession Partnership between Slovenia and the EU. By participating in the EU pre-accession structural instruments (PHARE, ISPA and SAPARD) Slovenia was preparing to enter the system of the Structural Fund and the Cohesion Fund after accession to the EU in year 2004. In June 2005 the new **National Development Strategy of the Republic of Slovenia**, as an umbrella document embracing all sectoral development strategies, was adopted by the Government of Slovenia as the principle strategic development policy of Slovenia, the new EU member state, followed by the National Development Programme 2007 - 2013 with National Strategic Reference Framework 2007 - 2013 and Operational programmes approved by the EU (Pichler-Milanović, 2008; www.umar.gov.si).

In 1993 the Government of RS divided regional planning to regional (economic) development and spatial planning. Macro-economic development is in the hands of the Office for Macro-economic Analysis and Development of RS. Government Office for Local Self-government and Regional Development of RS is responsible for regional policies while spatial planning policies are under jurisdiction of the Ministry of Environment and Spatial Planning of RS. The elements of regional policy up to the end of 1990s were determined within different ministries and different legislative procedures. Slovenia was solving regional problems on a more or less individual level in the form of partial interventions into the economy and preparation of the macro-economic and regional development strategy of Slovenia for the EU accession in year 2004. Regional policy in Slovenia has been traditionally targeted towards less developed regions in east Slovenia, and less developed municipalities (NUTS 5) and/or settlement (NUTS 7) areas, with population decline, high unemployment, structural problems, border areas with Italian and Hungarian ethnic minorities, and Roma population, and other peripheral and border areas (Černe, Kušar, 2006). Since year 2005 new regional policy documents brought new identifications of less developed areas - within statistical or development NUTS 3 regions and not at the national

level as before. Each of current 12 (statistical or development) regions need to prepare regional development programmes and some of them have also prepared the regional spatial development concepts as a way of inter-municipal cooperation, until formation of the administrative provinces in the future. Slovenia is geographically very diverse and inter-regional disparities will exist in future, therefore effective regional policy is needed to diminish the gap between more developed and less developed regions.

As a result of these macro-economic and top-down sectoral policies since 1991, the Ljubljana urban region (LUR) with 13 % of the Slovenian territory and 25 % of total population, represents the most important location of economic activities that generates 35 % of the country's GDP. In LUR the GDP per capita is for 30 % higher than the national average. LUR accounts for 27 % of exports and 37 % of country's imports respectively, 40 % of the total value-added, and almost half of all foreign investments in Slovenia. Productivity (e.g. value added per employee) is more than 25 % higher than in Slovenia while the average salary is 20 % above the national average, mirroring the concentration of employment in higher value added activities (i.e. banking, insurance, public administration, pharmaceuticals), and showing a rather successful transformation from the socialist industrial city to service based Central European capital city" (Pichler-Milanović, 2005a; 2010a; 2010b; www.rralur.si). The Urban Municipality of Ljubljana is the most economically developed location not only in Ljubljana urban region but also in Slovenia.

Figure 77: »Ljubljana urban region (NUTS 3)« with 26 NUTS 5 municipalities.



Source: Regional Development Agency of Ljubljana urban region (www.rralur.si).

Central Slovenian NUTS 3 region (or Ljubljana urban region - LUR) is the largest region in Slovenia with approx. 500.000 inhabitants consisting of the Urban Municipality of Ljubljana and other 26 NUTS 5 municipalities. In year 2002 **Regional Development Agency of the Ljubljana Urban Region** was established with the main task to prepare Regional Development Programmes of LUR for period 2002 - 2006, and the new programming period 2007 - 2013, as well as the operational programmes with the list of priority projects of regional importance eligible for EU funds. LUR is (still) without political representation.

The overall development goal of LUR is the following: "Ljubljana Urban Region is a conurbation, intertwined with nature. The region will achieve high level of global competitiveness and high-quality living through encouraging creativity and co-operation. The entire region will benefit from Ljubljana being "a European capital". To achieve this goal the main activities of LUR are:

- development of relationships between the public and private sector at the local, regional, national and international levels in order to promote development initiatives and enhance coherent regional development;
- acceleration of integrated regional development;
- planning and implementation of regional and other development programmes;
- acquisition of domestic and foreign financial support. The most important development programmes of LUR are: accessibility for quality of life, preserved heritage, efficient high-quality spatial planning, efficient municipal utility services, equal opportunities – contribution to the region's competitiveness, culture – competitive advantage of the region, e-administration, supportive entrepreneurial environment (www.rralur.si).

In December 2007 the Regional Development Agency of LUR advertised the public tender for preparation of the first regional spatial development concept and strategy following the new Spatial Planning Act (2007) as a joint venture between the Urban Municipality of Ljubljana and other 26 municipalities in LUR that will need to be completed and approved the regional council in year 2010 (www.rralur.si).

20.4. Spatial development policies

During transition reforms in 1990s spatial and physical (land use) planning was in »flux« while directions from the spatial planning documents approved in 1980s were officially extended until recently. In 1990s only several amendments were added to the existing articles of the spatial planning legislation (i.e. Spatial Planning Act in Transition, 1993, 2000; Settlement Planning Act, 1993, 1997; Building Land Act, 1997; Construction Act, 1999, 2000). In 2002 the National Assembly of the Republic of Slovenia (after 10 years delay) adopted the new **Spatial Planning and Management Act and Construction Act** with Spatial Management Policy, and two years later the **Spatial Development Strategy of the Republic of Slovenia with Spatial Order** (2004). These documents were the first new spatial planning documents after Slovenia's independence introducing a new legal system and a market economy values. The Spatial Planning Act deter-

mines the responsibilities and procedures in spatial planning, and defines the types and contents of spatial documents at the national and local level. At the national level these documents are **Spatial Development Strategy of Slovenia** with, **Spatial Order of Slovenia**, and **Detailed Plan of National Importance**, and at the local level, these are the **Municipal Spatial Development Strategy** with **Spatial Development Order**, and the **Local Detailed Plan**. The law also introduces a new document, the **Regional Spatial Development Concept**. With this document, the municipalities and other local communities have an opportunity to coordinate their strategic development issues at the regional level. This is an optional document, filling the gap between national and local planning level until the establishment of new administrative regions (provinces) in Slovenia. In April 2007 the National Assembly of Slovenia adopted the new (modified) **Spatial Planning Act** with new hierarchy and content of spatial planning documents (e.g. bringing detailed land use plans back to the legislative agenda) at the national, regional and local levels. As a result all municipalities are now obliged by the law to prepare the new detailed municipal spatial development plans until the end of year 2010 (Pichler-Milanović, Kreitmayer MacKenzie, 2008).

Spatial Development Strategy of Republic of Slovenia (2004) is further promoting polycentric urban development of Slovenia through 51 centres of (inter)national, regional and inter-municipal importance (together 62 urban settlements including city clusters/conurbations) and functional urban areas of 15 centres of national importance (i.e. regional centres). Ljubljana, the capital city, with Maribor, the second largest city near Austria, and Coastal conurbation (Koper-Izola-Piran) at the Adriatic sea near Italy and Croatia are also defined as centres of international importance. The new concept of polycentrism (as before 1990s) highlights the improved (equal) accessibility to public goods – administration, jobs, services and knowledge, located in these region and urban centres. They are also employment and service centres and important transport nodes in Slovenia. Therefore polycentric (urban) development of (3-12-16-19 urban centres) corresponds to the balanced regional development, and development of transport infrastructure in Slovenia (www.gov.si/mop).

Spatial planning documents of Slovenia are not favouring per se the role of Ljubljana as the capital city of Slovenia – but only as a centre of international importance together with Maribor and Coastal conurbation (Koper-Izola-Piran).

20.5. New spatial development strategies of the Urban Municipality of Ljubljana

As already mentioned before urban planning and strategic local development was neglected in 1990s in Slovenia because of the priorities of macro-economic reforms, and the connotation of such planning with the former socialist regime. Market forces, not planning prevailed until the end of 1990s, when the need for planning regulation was recognised to control and direct the spatial development of Slovenia, municipalities, local communities, towns and other settlements. Urban planners tried to control the post-Second World War development of Ljubljana primarily through the Master Plan (1966) and long-term comprehensive development document for the period 1986 - 2000

called "Ljubljana 2000". The latter was initially approved in 1986 but partly revised in 1995 in line with the market ideology and property rights reforms (i.e. restitution, privatisation, abolishment of compulsory purchase, etc.). The revised urban plan proposed densification and recycling of the existing urban built-up area and renewal or rehabilitation of the built environment from 1950s and 1960s. The greatest deviation from the original master plan occurred in form of 'illegal and semi-legal' construction of individual (family) houses without planning and building permission on land not designed for that use. In Ljubljana the scope and scale of this type of development was however less significant than in other large cities of the former Yugoslavia such as Zagreb or Belgrade. The other related phenomenon that occurred due to this unplanned dispersed development of free-standing single-family houses was the large scale of suburbanisation in late 1980s and 1990s, with insufficient provision of local infrastructure (water supply and sewage system) and local services (schools, kindergardens), and the increase in individual motorisation, daily commuting and transport congestion in 1990s (Pichler-Milanović, 2005a; 2010a, 2010b; Pichler-Milanović et al., 2007).

Since year 2003 local authorities including the Urban Municipality of Ljubljana are also obliged by the law to formulate and adopt their own long-term spatial development strategies, and detailed land use plans. The spatial development plans adopted in the 1980s were mainly in use in 1990s with only minor changes to accommodate some new ad-hoc projects that were not in accordance with the original spatial plans from 1980s (i.e. new commercial, recreation or housing areas). After adoption of the Spatial Planning and Management Act (2002) and Spatial Development Strategy of RS with Spatial Order (2004), the Urban Municipality of Ljubljana has been preparing the new generation of municipal spatial development documents while up-dating and revising the land-use and site/location plans. The new Spatial Development Strategy with Spatial Planning Concept for the city of Ljubljana was adopted in June 2002 under paradigm of sustainable development. This sustainable urban development strategy also listed some programmes and projects that are needed for improvement of the city competitiveness, quality of life and sustainability - but not specifically the internationalisation of the city of Ljubljana. These two documents are now part of the new Spatial Development Plan of the Urban Municipality of Ljubljana prepared according to the new spatial planning legislation (2002, 2007) that was in the process of public hearing and institutional negotiations from October 2007 until May 2010. This strategic city development document was adopted in July 2010 by the City Council of Ljubljana and approved by the Ministry of Environment and Spatial Planning of RS. In year 2007 the Urban Municipality of Ljubljana has adopted the new »Vision of the City of Ljubljana by year 2025« emphasising 23 strategic projects (from the list of approximately 100 projects) to be realised until year 2025, linking the three principal urban development aims of Ljubljana: »Ideal city« (i.e. the optimal city size – for living, working, recreation), »Sustainable city« (i.e. preserved natural and urban environment in the city and urban region), and »Slovenian metropolis« (European competitive capital city) (Pichler-Milanović, 2010a, 2010b; www.ljubljana.si).

The principle goal of the comprehensive Strategic Development Plan of the Urban Municipality of Ljubljana is »smart city growth«, emphasising also the internationalisation of the capital city through urban revitalisation, as the city of art, culture and knowledge, the safe and healthy city. Ljubljana is also an important transport node at the cross-road of V and X European corridors. The urban development strategy also emphasises the qual-

ity of life for local citizens, preservation of local identity, enhancement of city competitiveness, use of information technology, while at the same time solving the new urban development constraints such as: suburbanisation and urban sprawl, decline of the city centre, inadequate maintenance of cultural heritage buildings and housing estates, and loss of urban identity with expansion of market forces and globalisation of the cityscapes. At the national level it is also important to strengthen the innovative, competitive, attractive and polycentric Ljubljana urban region. The geo-strategic location of Ljubljana needs to be enhanced with strengthening of links and networks with other cities and regions in the cross-border Alps-Adriatic region, Central Europe, South-east Europe, and the Mediterranean in order to become a strategic location of the new European "potential integration zone" - Alpe-Adria-Pannonia (Pichler-Milanović, 2010a; 2010b).

The capital investment projects in Ljubljana that are approved at the national level are: new sports centre, university and technical library, new medical centre, and improvement of transport infrastructure. In Ljubljana urban region (NUTS 3), the most developed region in Slovenia, with competitive and sustainable capital city of Ljubljana with high quality of life, the most important regional development projects are: waste collection plants, integrative public transport, logistic centre, enterprise zones with technology parks, flood protection, and establishment of (natural) public parks. At the local level - the Urban Municipality of Ljubljana listed some strategic projects, of which the most important is the new railway and bus station in the city centre with offices, hotels, restaurants, shops, etc. Due to current financial and economic crisis since year 2008 some of these important city development projects are put on hold (Pichler-Milanović, 2010a, 2010b).

Detailed Spatial Development Plan of the Urban Municipality of Ljubljana (land use and site/location plans) has also been prepared together with revisions or adaptations of the existing land use development plans. Environmental impact assessments are required by the law including the expecting impact of the new spatial plan that was adopted in July 2010. The revised drafts of these detailed and new land use plans are also approved after many years of preparation or adaptations and modifications.

The **Capital City Act** has been also approved after some delay due to some disagreements between the Government of RS and the Urban Municipality of Ljubljana regarding the financial transfers from the national to city budgets (www.ljubljana.si).

The new spatial development strategy of Ljubljana was prepared taking in consideration the international recommendation (UN, CEMAT, EU), especially from the new EU documents such as: Lisbon Agenda and Gothenburg Agenda, Territorial Agenda and Leipzig Charter (2007), UN HABITAT Agenda (1996), and CEMAT Ljubljana Declaration on spatial impacts of sustainable development (2003). Also national legislation, sectoral strategies and programmes, professional studies, as well as needs and demands of the various departments of the Urban Municipality of Ljubljana and Ljubljana urban region were taken in consideration for preparation of the new comprehensive spatial development strategy and land use plans of Ljubljana. Therefore, for the first time after 20 years, the strategic development of Ljubljana has been prepared as a result of vertical and horizontal integration of different documents at the (inter)national, regional and local levels. After approval of the new Strategic Spatial Development Plan of the Urban Municipality of Ljubljana the next important phase in the city development of Ljubljana will be the

implementation of these (demanding) strategies, development goals, programmes, and projects - formulated at the national, regional and local levels, through public private partnerships and involvement of citizens and civic organisation in the implementation process – taking in consideration also the current financial and economic crisis and lack of investment capital from public and private sources as well as property market collapse and new demands for energy efficiency, retrofitting of buildings and low carbon cities (Pichler-Milanović, 2010a, 2010b).

20.6. Towards Competitiveness and Sustainability: A 'Story of Success'?

The EUROSTAT Europe of Regions survey at the end of 1990s had shown that level of development in Ljubljana Urban Region (NUTS 3) was ranked 144th among the 281 EU urban regions, including some cities from the other accession countries (Czech Republic, Estonia, Hungary, Poland, Slovenia, and Cyprus). Among Central and Eastern European urban regions the level of development was slightly higher only in Prague (index 103) but Ljubljana urban region was well ahead of Budapest (index 80) and Warsaw (index 73) (Pichler-Milanović, 2005a). Recent study of about 70 medium-size European cities according to 74 (selected) indicators available from European comparative databases has shown that the city of Ljubljana is ranked among top-20 cities, and the only one from the new EU member states (Giffinger et al. 2007).

Lack of coherent strategic planning policies at the national, regional and city levels during transition reforms in 1990s in Slovenia, and »investment-led response of public leadership in a »planning« vacuum« in the Urban Municipality of Ljubljana and surrounding municipalities in Ljubljana urban region, coupled with day-to-day urban problems and side-effects of transition reforms (e.g. privatisation, restitution, de-centralisation, etc.) have transformed intra-urban pattern of Ljubljana (i.e. suburbanisation and urban sprawl, de-industrialisation, tertialisation, differed maintenance of buildings in the city centre and housing estates, loss of urban identity, traffic congestion, etc.) (Pichler-Milanović et al., 2007; Pichler-Milanović, 2005a, 2010a). Many projects were not developed according to the urban development strategy from 1986, or detailed land use plans, but according to the needs and demands of the market economy and new private investors. Due to lack of administrative NUTS 3 regions (provinces) in Slovenia there is weak cooperation and strong competition between municipalities in Ljubljana urban region, with the strong central position of the Urban Municipality of Ljubljana, as the largest urban municipality in Slovenia vis-à-vis other municipalities in Ljubljana urban region.

Recently there has been some more cooperation between the Urban Municipality of Ljubljana and surrounding municipalities in LUR during formulation of the regional development programmes 2004 - 2006 and 2007 - 2013, and implementation of some infrastructure and environmental projects as well as during the preparation of the Regional Spatial Development Concept of Ljubljana Urban Region (2008 - 2010).

Between 2005 - 2008 lack of cooperation between the Mayor of Ljubljana, Mr Zoran Janković, and the former Prime Minister of Slovenia Mr Janez Janša (2004 - 2008) was

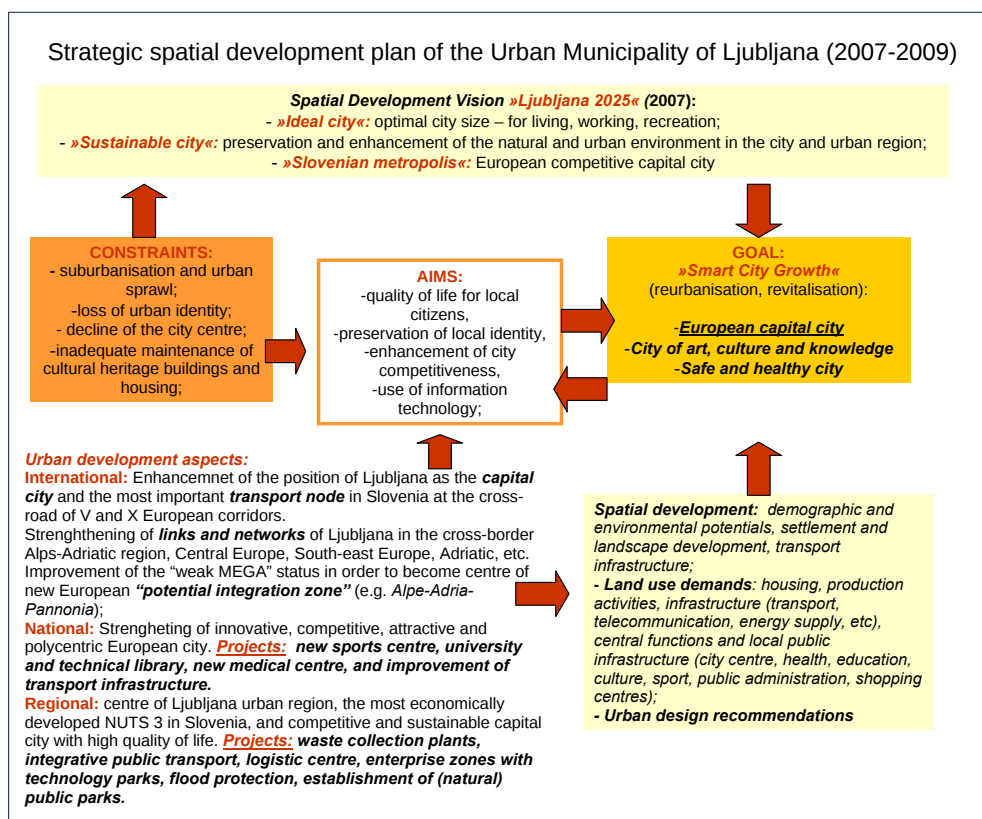
also counterproductive for the urban development of Ljubljana, and implementation of some projects of the national interest in the capital city of Ljubljana.

Due to some political conflicts between Slovenia with Italy, Austria and Croatia regarding the status of ethnic minorities, and unresolved land and property rights, there is also lack of more active inter-city cooperation between Ljubljana, and the near-by cities in the cross-border Alps-Adriatic region - Trieste, Udine, Gorizia (Italy), Villach-Klagenfurt, Graz (Austria), Istrian towns, Pula, Rijeka, Zagreb (Croatia).

Therefore the successful implementation of the new spatial development strategies and land use planning documents at the national, city and regional level, depends upon the ability of local leaders to encourage active involvement of different professions, social groups and local communities, as well as efficient role of the city authority in implementation activities. Strong political leadership with co-operation and partnership between different public and private institutions and other stakeholders that was often lacking in 1990s are critical now for the progress and essential for the implementation of comprehensive national, city and regional strategies in future. The most important spatial management activities in Ljubljana need to be focused on improving the international position, role and identity of Ljubljana within the European urban networks, while marketing the city's competitive advantages through implementation of the "flag-ship" projects. At the same time improving the economic and social cohesion and quality of life for local citizens is crucial for sustainable development of Ljubljana. The overall goal of the new spatial development vision, strategy, programmes and individual projects are to achieve the »competitive and sustainable Ljubljana with its own identity in national, cross-border, European and global networks« (Pichler-Milanović, 2010a, 2010b).

Ljubljana may never become the Central European metropolis - as might be the result of global city formation and city competition between Vienna, Berlin, Prague, Budapest or Warsaw. Yet, as a result of cultural heritage, stable political and economic conditions, improved social cohesion, quality of life, city identity and geo-strategic location in Europe – the city Ljubljana has the opportunity to become an attractive meeting place and tourist destination between two global cities in Europe - Venice and Vienna. Strengthening the political, cultural and transport links to support well established economic relations with cross-border cities and regions in Austria, Italy, Croatia and other cities in Central and South-Eastern European countries, are of critical importance for the future role of Ljubljana in Europe. At the same time Ljubljana needs to preserve the quality of life for local citizens to avoid the problems of homelessness, urban decline, social and spatial polarisation, crime and vandalism, or overcongestion, known to many other European cities.

Figure 78: Strategic spatial development plan of the Urban Municipality of Ljubljana (2007-2009).



Source: Regional Development Agency of Ljubljana urban region (www.rralr.si).

21. Strategic planning as an instrument of spatial development of Belgrade

Dejan Djordjević, Tijana Dabović

The strategic planning of the Belgrade metropolitan area, after almost twenty years of break, started with the democratic changes in 2000. The mentioned break corresponds temporally with the period of decline and fall of former Yugoslavia. One cannot understand the planning actions in the 21st century, which were taken in the period of transition, without the description of the period of degradation. Therefore, the work is structured into three parts: the first part refers to the period from the end of 1988 to 2000 and describes the period of deregulation, decline, devastation, the lack of the strategic vision of the development of Belgrade. The second part which describes the recovery is divided in two parts-the frame which influenced the strategic decisions in regard of the spatial development of Belgrade and, as the special part, the plans which resulted from the influences.

21.1. Belgrade, the decline

21.1.1. Description of the City

Between 1945 and 1990 Belgrade witnessed the largest demographic growth in its history. This growth was predominantly mechanical (migrations) and to a substantial extent spontaneous, but the super-concentration of the population did not correspond to the economic growth, notably the industrial growth. During this whole period, but especially in the latest phase, unemployment, access to adequate housing possibilities, infrastructure and the public transport were the most vital problems in the daily life of citizens of Belgrade. Those problems were more manifested in Belgrade than in other capitals of the former Yugoslav republics - Ljubljana and Zagreb. Correspondingly, between 1977 and 1984, the GDP and the salaries in Belgrade were lower i.e. below the Yugoslav and Serbian average, and lower than in Zagreb and Ljubljana.

The 1990s in Belgrade are marked by a deep crisis in all aspects of urban development and governance. This was the time of the rapid and extremely conflict burden disintegration of former Yugoslavia accompanied by war activities, destruction, atrocities, and ethnic cleansings. Contrary to the prevailing processes of transition, development and strengthening of the civil society and ensuing integration taking place in most of the former socialist countries, in Western Balkans the awakening of most aggressive nationalistic feelings was dominant. Belgrade, as the capital of former Yugoslavia with the population of some 22.000.000, the centre of federal institutions and a city of some importance in this part of Europe became the capital of a 'leftover' Yugoslavia with less than half of the former population and a president resistant to common sense.

During this period the city had witnessed an enormous influx of refugees paralleled only by an equally enormous emigration of young professionals and students, which utterly changed the previous demographic structure, not substantially in quantitative but definitely in qualitative terms. Thus, for the first time after decades of explosive growth, stagnation and a slight population decrease in Belgrade's urban region was registered, which apart from the negative migration was also owing to the negative natural growth, particularly in the inner city municipalities.

Due to the failed structural changes, no investments and especially no economic exchange with the international community (sanctions), hence no FDI, a grave economic situation of the country and especially of Belgrade became evident. In 1993 one third of employees were on the so called "imposed vacation", which actually equals unemployment. The inflation approached the inconceivable one billion percent, the state striped the citizens of their bank savings and the national reserves were emptied. The national currency – dinar – became useless and the German mark became the relevant transaction means. The country's population, but particularly the citizens of Belgrade were forced to rely on informal sources of subsistence, notably those of the grey/black economy. Disregard for law, contempt for institutions and chaos reined the city. The informal activities embedded themselves physically and mentally within the city's public space, redefining the formal appearance and the former urban culture of Belgrade.

As in most other former socialist countries, the housing stock underwent the conversion of the property status. This was performed by offering the tenants to buy the public apartments for quite lower prices than the real values. However, the vague criteria applied in this respect enabled many dubious speculations and instituted 'clientelism' on the housing market. Also, the insolvent owners were forced to sell their property and buy smaller apartments on less expensive locations. The result was a spatial segregation, where the new rich upstarts invaded the city centre and some elite residential quarters and the impoverished 'middle class' was compelled to leave towards the periphery. The buyback of the housing stock played a very important role in the course of the last decade since, as was the case with the parallel economy, it allowed the population of Belgrade to survive, by renting, selling or exchanging the flats they had obtained. Although these affairs were natural and legitimate, it is necessary to stress that this process took place beyond the legal framework. The absence of an effective juridical system and an efficient fiscal policy brought some advantages to former tenants. If they had been obliged to pay the taxes, they would have been obliged to increase the rents and thus lose quite a few tenants not having the means to adapt to new prices; or then, they would have had to accept lesser prices risking their own existence. It is hard to believe that the decision makers of that era did not realize this opportunity; therefore it is more likely that they decided to turn blind eyes, as in the case of the informal economy, and thus preserve the minimum social order.

By mid 1990s, 90 % of the population lived beneath the poverty threshold, the middle class dissolved, whereas a very small group of 'new rich', representatives of the ruling party or those controlled by them flourished.

The described difficulties provoked a collective identity crisis and eroded the confidence in institutions. The irregular salaries, problematic working conditions and the overall societal crisis completely de-motivated both the administrators and the public services users.

The emerging private sector was still unsteady and very limited in capacity and as such no valid replacement for the fading public sector.

As a consequence of the overall detrimental development coupled with the attrition of the value system, it is no wonder that the basic societal tiers began to collapse leaving behind an utterly disoriented society and a capital city with hardly any traces of the former character and urban culture. The civil society was hibernated for years to come.

The economic crisis did not necessarily induce a construction decrease. What has changed is the correlation between the private and the public initiatives as well as the proportion of the collective in comparison to individual housing. The principal contractors in 1990s were the “new rich”, war profiteers and some system supporting enterprises. They mostly invested in the construction of individual housing and small scale buildings or adaptation and extension of the already existing buildings. However, a not neglecting part of “normal” citizens, especially in peripheral urban parts, was also engaged in illegal building activities.

The absence of the legislative effectiveness continued to encourage the illegal construction. In the period 1975-1997, the Town Planning Institute of the City of Belgrade did several studies on this phenomenon. Below, some of the conclusions are summarized:

Table 61: The illegal construction in Belgrade for the period 1975-1997.

	Houses	Weekend houses	Other constructions	Total
1975	17.903	1.062	12.192	30.527
1988	31.433	3.353	38.169	72.955
1995	33.594	3.351	39.754	76.669
1997	37.425	3.357	43.290	84.072

Sources : Dr. Zoran ZEGARAC: Illegal construction in Belgrade and the prospects for urban development planning, Cities, Vol. 16, No. 5, Elsevier Science Ltd., Great Britain, 1990.

The studies for the years 1995 and 1997 remain incomplete, so the figures in the Table 61 represent only 50-70 % of the real state of the art. However, it is well known that they correspond with a dynamic period of the illegal construction. Some even speculate that due to such dynamics during the 1990s number of legally and illegally constructed buildings by 1997 was equal (Petrovic, 2004: 177). It is estimated that until Planning and Building Act has been voted in 2003 the number of illegally constructed houses exceeded 40.000 (Vujovic and Petrovic, 2007).

The increase of the illegal construction on Belgrade's periphery is characterized by the usurpation of arable soil, devastation of the natural environment, construction on the land of public interests (transportation axes and infrastructure corridors), the absence of water supply and sewage system, building on geologically unstable terrains or those liable to flooding, the absence of services and public facilities, etc. . . . Moreover, the 1990s are marked by illegal construction in the city's core, too. This refers particularly to two types of installations: the permanent installations and the temporary installations.

The constructions of the permanent installations encompass the construction or adaptation of the family houses and the vertical expansion of the buildings. Even though most of these constructions are located in the zones of Land Use Plans, and most of the contractors had construction permits, the absence of supervision and potential sanctions allowed the builders to modify the original projects in the course of the works (the projects for which the permit was obtained).

The temporary installations were the street counters and the “kiosks”, which with the progression of the informal economy, began to “pop up” everywhere in the city. After a certain time, the number of these temporary buildings widely surpassed a tolerable limit, occupying the public spaces, such as the sidewalks (often narrow), squares, and passages. Due to this phenomenon, the town planning of the 1990s in Belgrade is very often labelled as “the kiosks urbanism” (“kiosk urbanization”). The “kiosks” are by definition assembly installations, in plastic, white iron, etc. In the legislative system they are considered as temporary, but in reality they proved to be long-term. The most exemplary case was that of the “kiosks” constructions in the municipality of Zemun, made of solid materials, so that they served also as dwellings.

21.1.2. Actors and stakeholders

The principal actor that governs the City of Belgrade is the City Government of Belgrade with its services: Water management service, Management of communal services (waste disposal service, underground infrastructure and the construction services), Public transport enterprise, Central heating service and Road network service. Every municipality (10 inner city + 7 peripheral urban municipalities) is responsible for local affairs, notably administrative matters (construction permits, property transfers, etc.). The number of the elected representatives depends on the number of inhabitants of the municipality, and the City Assembly of Belgrade consists of 110 elected representatives. The budget of the City Government of Belgrade is approved by the Parliament of the Republic of Serbia, other sources comprise the loads for the urban services and, from 1996 the municipal tax of 3 % applied analogous to the VAT.

Although several elections were organized since 1991, thanks to the control exercised through the police, the army, the media and the controlled market, the constituted coalition of the Serbian Socialist Party led by Milosevic and the Yugoslav United Left Party succeeded to stay in power until the presidential and local elections on 24 September 2000. However, the Municipality of Belgrade witnessed the political change after the municipal elections in December 1996 respectively after the recognition of the electoral results in March 1997, when the opposition was endowed with governing the city. But this did not necessarily mean that the situation in Belgrade improved.

When the opposition seized the power in the City Government, Belgrade became a new political “battle field” of the ruling party at the Republican tier and the opposition at the local. Needless to say, the victims were once again the citizens of Belgrade. The first difficulty met by the new team was the disappearance of the documents concerning the City budget and its management in the preceding period. Next, the approved budget in the Serbian Parliament was utterly insufficient and in contrast to the pre-election promises to cancel the municipal tax, which, given the economical circumstances of that era, was an additional burden for the citizens of Belgrade. Consequently, the opposition was

obliged to keep it. Moreover, the ruling regime began to obstruct the functioning of the urban services, especially the Public Transportation Enterprise, for which the responsibility was finally relegated to the Republic tier during the summer 2000. At the same time, the major public enterprises (directed and controlled by the regime) refused to pay the loads for urban services, reducing thus the City's already limited means.

On the other hand, never before was the opposition in power and consequently had no experience in governing the city. Furthermore, the opposition had to put political interests on top of the agenda and thus prior to the interests of Belgrade's citizens. Political disputes and discord among the opposition parties resulted in a City Government once again ruled by one party.

The government and political crisis at the city level, contributed to the malfunctions of all the urban services, leaving the inhabitants on their own. In order to handle the urban chaos, the city-dwellers had to take charge of a number of activities ordinarily performed by the City's services. One of the most striking examples in that context is the one of the central heating. During several winters, the central heating was far from satisfying the minimal needs. Not having been able to provide the central heating, the City was not even cooperative in supplying other sources of heating. The inhabitants were obliged to provide for the firewood and to rely on the parallel market for fuel and gasoline.

Although those individual initiatives were not largely visible, or of common usefulness, in due time they elicited the idea of the link between the private and the public interest. The idea of a parallel public transport system in private hands and with affordable prices was soon realized to the benefits of the citizens. Since 1991 the number of public buses was reduced to roughly 65 %, because of the deficient maintenance of the vehicles (lack of spare parts) or lack of the financial means for the purchase of the new vehicles. The private network was constituted with second- hand vehicles bought in West European countries. Soon after that they were integrated in the existing network of lines, and engaged on the more frequented ones. Spontaneous at first, this initiative is organized by a specific union today and negotiates directly with the City.

21.1.3. Financial management – allocation of resources

Owing to the lack of documentations, the question of the City's financial means management remained mostly unsolved. The expenditures of Belgrade's municipalities basically refer to the administration costs, but a not negligible part was being allocated to the political and associative activities. According to the submitted figures, the investments in the economical domain were completely insufficient. On the other hand, responsibilities and tasks of City of Belgrade were a lot more complex than those of the municipalities; the City was primarily investing in the communal services, then in economic activities, education, information, the social security etc. The logic of the City's budget allocation raised some important questions:

In a rather extraordinary situation, why was that much investment allocated to economical activities (30 % of the City's budget) if the principal function of the City was to assure the functioning of the public services, the social security, and guard other public domain interests?

What criteria had the City applied investing in certain economic activities and what public interests were advocated?

Why were the means allocated to the information sector higher than those allocated to the social security, etc.?

Beside the financial means, the functioning of the city equally necessitates political means: the City generally acquired the attitude of "laissez faire" in respect to the spontaneous changes in the city. Thus, there were very few radical efforts to "liberate" the sidewalks and others public space from the counters and "kiosks", especially since the latter provided services to the inhabitants, but also contributing to the City's budget as a new income source (the taxes for the space occupied).

21.2. Belgrade, the recovery (the frame)

21.2.1. Global pressures and Intra-urban competition and territorial restructuring

Beside the macro-spatial consequences of the globalisation and the increasing urban competition, urban development in the last two decades is ever more concentrated upon the governance approaches in which cities are treated as entrepreneurial units. This presupposes adequate urban-marketing strategies, targeted at very different aspects of urban life, but all aimed at the improvement of the location advantages. Successful city marketing is closely linked to the location planning, efficient transport management, conversion of brown fields, protection and management of open areas, urban core and suburbia revitalisation, etc. All these activities require the restructuring of the municipal competence, new modalities of inter-municipal cooperation and the transformation of the local and regional governance, encompassing novel organisational forms and policies on both tiers.

All the same, the intra-urban competition is a manifest, perhaps also desirable consequence of global and local pressures and is directly reflected in the heterogeneous development of urban life styles, which follow certain territorial patterns. In all the metropolises of Southeast Europe, a substantial upgrading of the city's core attractiveness might be observed, together with policies targeted at the improvement of the city's image as a commercial and cultural centre. Thus, the concentration of the tertiary, consumer and command potentials⁸⁶ in the city core zones is one of the evident trends in cities in transition. Bearing this in mind, some, no matter how desirable propositions in the Spatial Plan of Serbia (1996), dealing with the balancing of the polarisation impacts of the Belgrade's agglomeration, become obsolete.

But, there are also other trends with a direct impact on the territorial restructuring. They involve the shift in behavioural patterns, especially in terms of the consumer society creation, where the urban identity is built upon the consumption of globally available goods, services, but also ubiquitous urban spaces. Public spaces, even whole suburbs are rearranged and marketed according to the consumption patterns of particular target groups. In Belgrade, this is evident through the construction of numerous hypermarkets,

⁸⁶ SKraetke, S. 1991. Cities in Transformation: the case of West Germany, in Benko, Dunford: Industrial Change and Regional Development, London.

in which consumption is not perceived as a necessity, but as an event. Thus the global trend in creating "consumer compounds" is rapidly infiltrating and changing the spatial and cultural models of Belgrade's suburbia. In addition, a drastic increase of globally influenced catering services, as a particular form of global culture consumption is omnipresent. Consequently, particular suburban city parts become self-contained, indicating to some initial stages of the "edge cities", which in their functional diversity, combined with facilities city core cannot offer, compete strongly with city centres. Such inevitable processes directly influence the de-territorialisation of the local identity, the creation of omnipresent urban spaces and a specific territorial/functional restructuring.

In Belgrade, the silhouettes of some "edge cities" are already perceivable and cause a particular spatial/functional redistribution. At which pace will this trend develop in future is difficult to prognosticate, but it is certain that the structural changes in production (global sourcing) and consumption patterns (consumer society) will have wide ranging impacts upon the Belgrade's settlement structure. On one hand, independent "edge cities" (New Belgrade, Banovo Brdo, Zemun) will compete with the core city, whereas on the other hand, further functional concentration will take place in the municipalities of high centrality. Hence, the competition is pervading not only the inter-urban, but very explicitly also the intra-urban level. Best illustrative example of this is the recent development of New Belgrade. Since 2001, its municipality with some 250.000 inhabitants has managed to attract most of the international companies presently operating in Serbia. According to the already adopted spatial development plans, it will witness the construction of more than a billion of square meters of business premises. This has triggered a positive trend in the employment and the GDP per capita. Consequently, the number of working places in the last three years has risen from 53.000 to 63.000 and the average gross income is the highest in Belgrade and the second highest in Serbia. New Belgrade gains on profile as the country's banking centre with head branches of the "Raifeisen bank", "Societe Generale", "HVB", "Folksbank", "Eurobank", etc. Also the head field offices of "Mercedes", Volkswagen", "Peugeot", "Fiat", "Skoda", "DHL", "Siemens" or "LUKOIL" are situated there. The most dynamic axes and areas of development are: Omladinskih brigada St., III Boulevard, Belgrade Arena, AVNOJ Blvd., Milentije Popovic St., Mihailo Pupin Boulevard

The private sector is booming in the last few years pushing aside the former socially owned enterprises. Presently, 99 % of the enterprises are in private or mixed ownership⁸⁷.

A constraining circumstance in the rational, planned direction of these processes within the Belgrade's region is the still unsolved land property relations inherited from the previous social system and additionally complicated in the 1990s by an enormous illegal construction. This is particularly affecting the city's core, whereas New Belgrade, as probably the most competitive business location in Belgrade presently profits from such state of the art. Additionally, a good infrastructure and excellent parking facilities and the immediate proximity to the city's centre open the prospects for its promotion as a relevant business centre in Southeast Europe. Thus, the largest business park in this part of Europe is being built by Israeli investors, comprising of some 150.000 square meters business area to complement the already reconstructed business centre "Usce" built by the Consortium "European Construction"⁸⁸. Beside the announced new investments in further business locations, in New Belgrade the construction of the opera house and the

⁸⁷ <http://www.novibeograd.org.yu>

⁸⁸ *ibid.*

“aqua-land” is planned, together with capital transport infrastructure investments, such as the new bridge reducing the traffic load on existing bridges. Furthermore, the light rail public transport and the inner semi ring road planned to be realised within the next five years will additionally contribute to the better access to New Belgrade from other parts of the city.

However, the changing spatial patterns must not yield only to bare market mechanisms in a democratically still insufficiently developed and articulated environment. Therefore, a clearly defined market based land policy, as the key regulatory mechanism in managing the Belgrade’s metropolitan area must yet be developed, so as to actively direct the spatial redistribution of economic activities, especially in the domain of industry and other low accumulating activities. In this context, in Belgrade there is already a nuanced offer and demand of business locations, also directly reflected in the height of the rent. For all these reasons, it makes sense to reconsider the variety of spontaneous processes, so as to appropriately anticipate and direct potential negative spatial consequences.

21.2.2. Aspects of new urban governance

The first decade of the new millennium has been marked by the stabilization and the pacification of the Western Balkans; as a result a certain progress in terms of development and governance efforts is evident in Belgrade. This reorientation is manifest in the focus upon some long neglected themes, such as the integration into European processes, metropolitan networking, respectively inter-urban relations, urban competition and global pressures with their impact upon Belgrade’s intra-urban development.

As far as the integration processes of the metropolitan networking in this part of Europe, the identity problem has been raised as a decisive factor to build upon, if the economic, social, cultural and finally spatial cohesion is to be achieved in the long run. An articulated identity is not merely the result of the internal dynamics and history (which in the case of Southeast Europe, and especially former Yugoslavia was negating the common heritage and favouring the disintegrative national rhetoric), but depends upon complex relationships with the ‘outer’ world. The very idea to achieve a better integration of this space is grounded in the need to spur the effectiveness in synchronizing and realizing common development goals. The main prerequisite for that, however, is to build democratic, civil societies deeply rooted in stable states based on the law. One of the major objectives of the political and economic actors, especially in view of metropolitan networking, as one of the first steps in establishing an improved macro-regional cooperation and finally cohesion, is the mobilization of all resources and the identification of sociable forms for the accomplishment of such an important endeavour. The focus should be put upon such spatial structures which might contribute to the creation of a functional, diversified and much more effective urban network within which, through synergy effects each particular city would enhance its competitive position. The attractiveness of the whole macro-region would also be upgraded if efforts are concentrated upon seeking those investment niches which are not already exploited by the metropolitan regions of Middle and Middle-East Europe.

In Belgrade, the interrelation of citizens with city's institutions and the access to urban facilities is still not of a very high quality. What is needed is a more efficient transport infrastructure at the intra-urban, but even more so at the inter-urban level, so as to realize a more dynamic and effective cooperation. This also includes joint and coordinated investments in large infrastructure projects, a joint inter-regional offer of communal services, waste management and other projects of mutual interests. All these activities require the restructuring of the municipal competence, new modalities of inter-municipal cooperation and the transformation of the local and regional governance, encompassing novel organizational forms and policies on both tiers (local and regional).

In Serbia, there are obviously certain problems and constraints linked to the concept of regional (metropolitan) and local (urban) development planning, especially concerning the application of some recent planning and governance trends based upon the latest theoretical research. To sum up, the concept of regional policies and measures has not been formulated yet. This implies that incentives are carried out in an ad hoc, reactive and non-coordinated manner. Such deficiencies are amendable only by introducing new legal acts and national policies which would enforce the overall system of governance and harmonize the work of ministries and other planning institutions at all governmental tiers. According to Lazarevic-Bajec (2004), although the new Planning and Building Act (2003) anticipates the elaboration of such a document, there is yet no valid and updated long-term development strategy at the national level to steer the economic and overall societal development and offer a relevant framework for the regional and local policies. Therefore, a system of general strategic policies at the level of the Republic is needed, together with sector policies to mark bench the planning at the regional/local tier.

Regrettably, there are only a few concrete initiatives, and they are hardly ever the expression of the political will, which aim at creating a relevant framework for the preparation of the strategic regional/local plans. Regional policy, if there is one at all, consists of ad hoc measures expected to solve only urgent problems.

Another problem refers to the institutional responsibilities which are not defined precisely thus hampering the inter-ministerial coordination. Admittedly, the needed funds for this purpose are limited, or inaccessible. Moreover, most of the planning institutions adhere to a traditional, rigid planning model, which is deterministic, inflexible, with fixed land use parameters and regulations. This calls for a decisive shift in the methodology which would enable the planning to respond quickly to changes occurring in all societal domains but foremost in the economic sphere. However, the local communities lack the capacities, either financial or professional to change the approach to planning and introduce more innovative and novel models in view of participative, strategic and action plan oriented planning. Thus, the planning system, as practiced presently, is predominantly planners' centred, implying that it is the planner who identifies the problems and seeks for planning alternatives rooted exclusively in the 'scientific rationality'. There is little, or no room for different interests and ideas and consequently hardly any room for various stakeholders and shareholders to participate in the planning process and the ensuing implementation phase.

21.2.3. Policy initiative suggestions

A prosperous development cannot be grounded upon sector plans anymore, or as is the case in Serbia, exclusively upon unreal and thus illusory spatial plans with solutions lacking the economic-financial, social, and even sometimes spatial assessment. To ensure a more prosperous development especially in respect to metropolitan development and governance some policy recommendations are suggested.

General policies aiming at:

- building/reforming institutions;
- reinforcing the civil society;
- systematic harmonization of the legal system as to European requirements;
- constitution of the regional governance tier.

Specific policies aiming at urban (metropolitan) development, planning and better urban governance:

- formulation of the 'Capital City Act';
- building of the normative-institutional framework;
- application of the integrative planning method, with a strong inter-sector, i.e. inter-ministerial coordination;
- synchronization and coordination in the elaboration of spatial, economic and social strategies and plans;
- elaboration of action plans to support (urban) development strategies;
- definition of clear criteria and indicators to measure the achievements of spatial, economic and social plans;
- development of implementation tools;
- decentralization in terms of the governance and economic power;
- introduction and operation of the up-dated system of techniques and mechanisms which enable a more efficient and reliable development governance;
- intensifying the relationship of the government, profession and the public (interests, investors, etc.) and the introduction of a more effective and timely public participation, which would prevent the ideological bias of plans;
- development of the education/training system not only for professionals but also for governmental officials and citizens.

21.3. Belgrade, the recovery (plans)

In this part we will present chronologically the basic methods, concepts, goals and guidelines for spatial development of Belgrade contained in three strategic documents adopted (General Plan of Belgrade 2021 and Regional Spatial Plan of Administrative Area of Belgrade) or given in a form of draft (City of Belgrade Development Strategy) after 2003. Before we start it is needful to inform that the last General plan of Belgrade was

adopted in 1985 and Spatial Plan of Belgrade in 1981, therefore, besides some amendments of these documents due to changed context of its spatial development in 1990s Belgrade was lacking a strategic document for at least a decade.

21.3.1. General plan of Belgrade to 2021

After the democratic changes in Serbia 2000, the preparations for the new General Plan of Belgrade to 2021 began. The bases for the elaboration of the plan were: The Spatial Plan of Belgrade from 1981 with the supplement from 1999 and the General Plan from 1985. Moreover, The Spatial Plan of the Republic of Serbia from 1996 offered the significant directives for its elaboration. As the preparation of the plan began and the Draft was determined, the expert discussion and public inspection were finished by 27 March 2003, while the new law became valid on 13 May 2003, so the General Plan was continued, coordinated and based both according to the previous law and the existing one.

It was prepared by the Urban Planning Institute of Belgrade and adopted by the Assembly of the City of Belgrade in September 2003. It included the area of 727 km² and the population of 1.320.000.

The basic characteristics of the method according to which the General Plan was made are the following: the transparency of the procedure and the inclusion of large number of different and concerned subjects, the professional work, conducted in four cycles where a great attention was paid on the synthesis of the results - town-planning solutions, considerably relied on modern computer tools in solving the different tasks during the work, the team work with the emphasized role of the combined team. The method of work for evolving the General Plan consists of the following working lines: the work on the basic block of the professional activities, which gave, as the main steps, the Hypothesis, Conception, First Draft and Draft; the estimation of the inter-report given by the expert council of GP, politicians, experts and citizens; the co-operation with the citizens and municipalities, secretariats, institutes and the public enterprises of the City of Belgrade.

The Plan first contained the problems and perspectives of Belgrade referring to its European dimension, society, population, economy, building land, environment, urban tissue with the review and estimation of the preceding plans concerning its territory. The proposals of the general town-planning goals resulted from the review of the present situation and the estimation of the future development of Belgrade as: the city of our country, the European metropolis, the Danube-orientated, Belgrade in collaboration with nature, the city of the sustainable development, the town-planning regulated city, the city of combined memories, circular in shape, vital economically, the city for all people, linked and accessible and the city of culture.

The main theme spheres, the General Plan dealt with, consist of the corresponding sub-wholes, worked out by the Plan. Those are: Nature morphology - hydrology, geology, seismology, climate, pedology; Society - population, social phenomena and processes, economy, law; City building land - areas, cadastre, property status, status of utilization, market, land policy; City tissue - residence, centres, commercial contents, public services, economic zones, public spaces; City green and landscape - elements of nature, green areas of the city; Transport - public, individual, railroad, air, river, pedestrian, bicycle, lines of communications, streets; Infrastructure - energetic, telecommunication, water, communal.

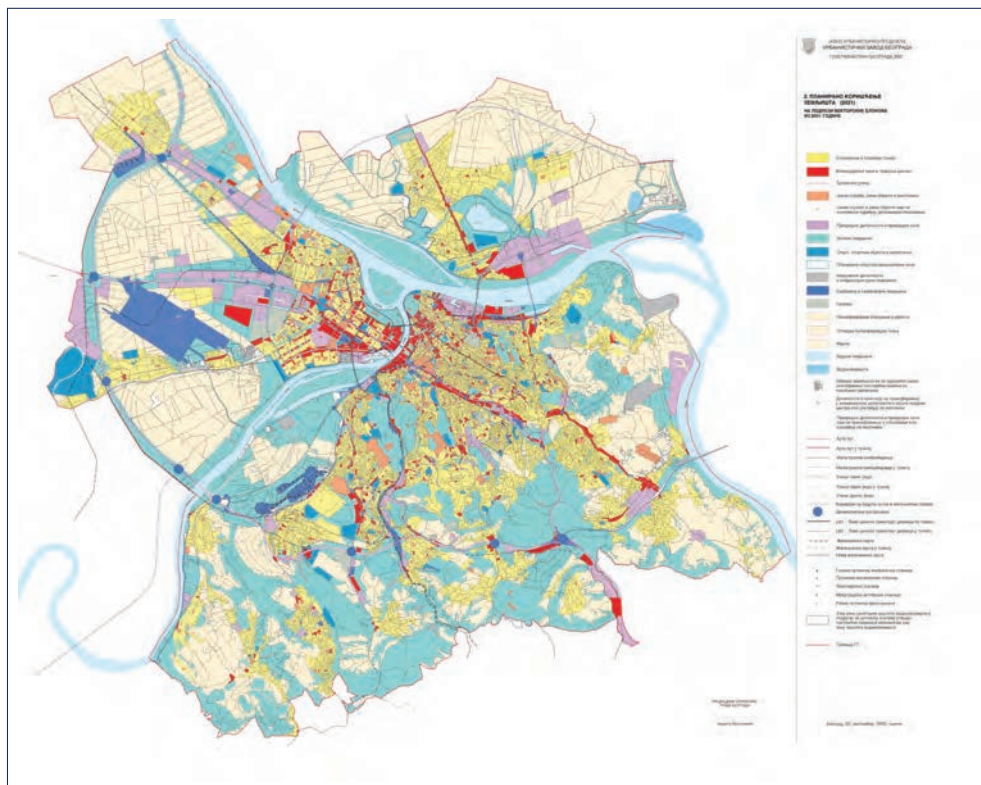
Large projects and defining the prior developmental wholes are the parts of the plan, as well as the nature protection, environmental issues, cultural inheritance, sustainable development, the rational use of the resources etc. The General Plan gives the suggestions of the development of Belgrade for two periods. It is the combination of the vision of the future to 2021 and the significant actions which can be operative up to 2006.

The basic idea, built into the concept of the organization and space regulation of the GP, is the inner transformation of the urban tissue with the corresponding outer construction for those sectors estimated to have the clear need for the new locations. The sectors are the following: economy as the promoter of the development, the system of the public greenery as the specific recreational resource and ecological infrastructure, as well as new housing construction as an answer to new needs of residents. The second idea is the development of Belgrade over the large projects, respecting the need of small investors to build in practically every point of the urban tissue. The large developing projects are defined for two temporal horizons - for the first phase which can be defined conditionally as the period up to 2006 and for the further development to 2021. The third idea is that each extensive construction must be supported by the corresponding communal and traffic infrastructure, by which not only that the environment is protected, but it is provided that it becomes the part of the entire Belgrade system. The economic, housing, recreational, tertiary and other extensive construction is not possible without the parallel construction of the necessary communal infrastructure and the corresponding lines of communications. The fourth idea of the long-term conception is to ensure the strong connecting of the built tissue with the natural ground whereon the city originated through the realization of the GP. The idea was carried out in several different segments and sectors. The following parts are the most important for its realization: system of public greenery, strict evasion of building on unfavourable ground, zoning of possible economic activities, strong orientation towards rivers, particularly the Danube, instructions for using the local water resources, organized introducing of autonomous resources of bioclimatic energy, solar energy, wind, geothermal potentials, with the necessary economy measures at the households in the zones of the low population density. The fifth idea is the planned keeping of transport corridors for the future as well as land, suitable for different purposes. The areas purposed for the urban activities are larger than it is needed in order to enable the city development even after this planned period. By the defining of these areas in the GP, the possibility has been made that the city activates not only the planned but other forms of the land protection (buying the land, expropriation, etc). It is planned that the above mentioned developing tasks should be achieved in the conditions imposed by the transition of the society. The new social framework, market and democratic relationships, establish new claims to the GP. The three most important are: flexibility instead of rigidity, dynamism instead of static quality, as well as the plan supporting the processes instead of the plan supporting the "picture". Having in mind previously mentioned, the important idea is that the GP should be opened for every investment, especially those important ones that move the economic development and contribute to better living standards. In this sense, the GP has a high level of the flexibility that enables the investment requests to be carried out in the way to satisfy the private needs, but at the same time not to endanger the common and public interest of the city as a whole.

The conception of the GP to 2021 represents the natural continuity with the plan from 1985. The continuity is realized into the several following basic elements: accepting the existing city construction and real estimations of the physical possibilities of further interventions; the continuity in planning the traffic and infrastructure in accordance with the existing and planned purposes of the land; the integration of different contents, if they do not threaten each other, instead of separation; the planning of the protection and development of the remaining natural green massifs deeply engraved upon the city core, and cherishing the inner city greenery. Comparing with the plan from 1985, the changes are the following: the increase of the planned built area of the city; the changes in social and economic circumstances of the future development; the planning of several major developing projects; the planning of areas for the individual construction, especially in the continually built city tissue as the expected dominant form of solving the housing needs in the future; the more intensive regulation of the suburban areas at the city edge for the more uniform total development; the more rational planning of interventions in traffic and infrastructure; the emphasizing of three branches of the natural corridor the Danube and the Sava with the Veliko ratno ostrvo as the main motif of the spatial organization.

The plan itself is structured in such a way that it gives the following information about: the area of the General plan, the building areas and the city building land, the public and other building land. Moreover, there are directives concerning the basic purpose of the comprised area, the protection of the area, the traffic and infrastructure, the spatial zones and urban wholes, the expense and sources of financing the planned construction and reconstruction, the regulation of areas of the vital interest for the defence and protection from the natural disasters and other disasters in danger in peace and war, as the directives for the first phase in the General plan realization and the rules for building and reconstruction. The graphic supplements to the plan were done in scale at 1:20000 (18 in total) with the ones that make the documentation (14 in total). The Documentation of the Plan consists of different analyses, studies and investigations, special files and lists, opinions, agreements among the authorities, organizations and companies, data about the performed public inspection, expert discussion and co-operation during the drawing up the plan.

Figure 79: Planned land use (2021) in General plan of Belgrade.



Source: http://www.beograd.rs/documents/plan2021/02_plan_namene.jpg.

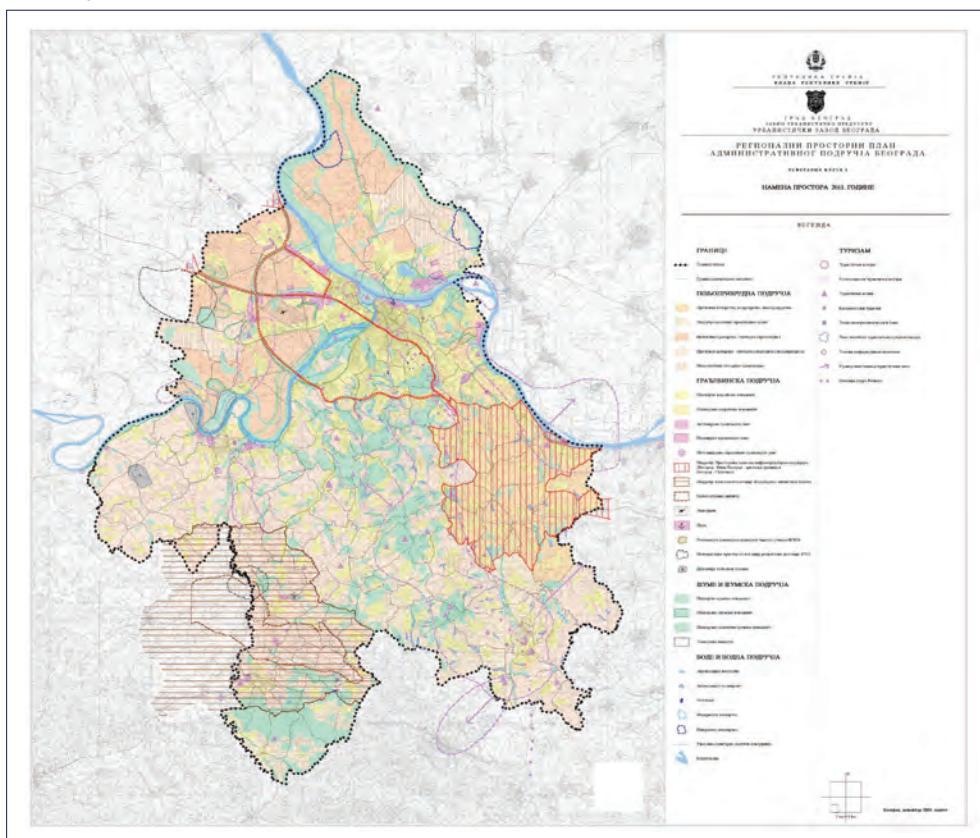
21.3.2. Regional Spatial Plan of the Administrative Area of Belgrade

One year after the Decision on the Elaboration of the General Plan was made in 2002, The Decision on the Elaboration of the Regional Spatial Plan of the Administrative Area of Belgrade was also made, adopted by the Assembly of the City of Belgrade two years later. Its elaboration was given to the same institution as the General plan – Urban Planning Institute of Belgrade.

The intention of the analysts is to represent the Regional Spatial Plan of the Administrative Area of Belgrade (RSPAAB) as one of the basic instruments in the implementation of the idea of the sustainable development based on the principles of the adopted declarations and charters that oblige the Republic and the City to obey and apply them in planning and realization of the planned solutions. The planned procedure is organized through four basic dimensions: natural, social, economic and institutional. The first three make the model of the integral planning in the interdependence, while the fourth one represents the institutional-organizational framework for the implementation and control of the realization of the Plan in the post-planned period. The planned propositions and solutions are defined on three levels, according to the temporal horizons, the level of obligation and the possibilities of using the adequate European funds for their realiza-

tion on the level: 2006; 2011; and after 2011. Furthermore, their realization represents the obligation of the certain institutions defined in the chapter Measures and Instruments for the Implementation of the RSPAAB. The Plan refers to the administrative area of Belgrade, consisting of 17 urban municipalities (total area of 3.224 km² and the population of 1.572.000 by the 2002 census) and its adoption creates the obligation of coordinating the future making of the plans.

Figure 80: The purpose of an area in 2011 from the Regional Spatial Plan of the Administrative Area of Belgrade.



Source: <http://www.beograd.rs/documents/regplan/namena.jpg>.

The Regional Spatial Plan of the Administrative Area of Belgrade includes: the Strategy of the protection, spatial organization and development of the administrative area of Belgrade; the Ground plan containing expertises, supplements of the representatives of the municipalities of the metropolitan Belgrade, conditions and opinions of the authorized institutions, documentation and graphic supplements (R 1:100.000 and 1:200.000) and the Draft plan. Many experts from Urban Planning Institute of Belgrade, scientific institutions, public companies participated in the elaboration, as well as the representatives of the municipalities of the administrative area and those municipalities the territories of which are extending out of its borders.

The plan is structured through the following chapters: Scope, aims and basic conception of the Plan; Nature as the basis of the spatial development; Social aspect of the spatial development; Ecological-economic capacities of the area; Prevention, regulation and utilization of area and Usage and realization of the planned conception and solutions (to 2006) - measures and instruments.

Taking into consideration that the regional spatial plan is being about, three territorial levels are defined and articulated in the planned procedure: the first one which includes the territories of the municipalities of the administrative area or the City of Belgrade; the second one which includes the additional 7 municipalities in the direct surrounding which are in the intensive functional connections with the first level and together they make the metropolitan of Belgrade; and the third one - the larger number of the municipalities in the wider surrounding which, together with the City of Belgrade (according to the researches of the Spatial Plan of Serbia 1996), make the functional macro-region of Belgrade. The competence of the plan, however, refers to the first level only, while it represents the strategic directives for the second and third level for the future collaboration on the themes and problems of the spatial development.

The basic aim of the protection, spatial distribution and development of the city of Belgrade, defined on the basis of the set of the main restrictions, on one side, and the set of the possibilities and values, on the other side, has been the organized activation of the regional spatial potentials of the City of Belgrade, based on the principles of the sustainable development, by which it will be more attractive and the conditions will be provided for achieving the standards of the European metropolis. The mentioned aim served as the basis for defining the strategic tasks: redefining and positioning of the Belgrade metropolitan in relation to the European surroundings and defining its place and role in the European context; establishing the effective and sustainable transportation infrastructure and the appropriate integration into the transportation network (TENs and TINA); de-concentrated concentration - restructuring and improving the economic structures for the increased economic competitiveness of the metropolitan; higher cohesion of space through the development and improvement of the infrastructure networks within the City of Belgrade, i.e. the increase of the degree of the accessibility of infrastructure for all inhabitants of the villages and urban settlements; defining the new land and housing policy in accordance with the objectives of the economic and social development; keeping and improving the natural and cultural values and characteristics and strengthening the identity of the City of Belgrade; protection, restoration and improvement of the natural environment, degraded and endangered by human activities; profiling the Belgrade metropolitan through the specialization of the economic activities, especially servicing ones. The basic aim and the mentioned strategic tasks are considered to be achieved if the following is done: the defining and organized interest organization of the Belgrade metropolitan, as the unique functional whole without fixed borders, whereat the regional relations and mutual influences are controlled statistically and according to the plan for diminishing the differences among some parts; linking the settlement nets of the City of Belgrade by the system of connections (village-community of villages, community of villages-urban centre, urban centre-Belgrade) and its affirmation, defining the development of the technical infrastructure that will also emphasize the linking of Belgrade, considering the needs of the decentralization and privatization of the functions, not the networks and projects; articulation of the economic developing

complex on new structural foundations taking into consideration free market and defined ecological and environmental limitations; affirming and cherishing the natural and cultural heritage in the real economic context of both extreme and local significance, the urban reconstruction on the economic-social-physical foundations, as well as the reconstruction of the villages in accordance with the financial possibilities; improvement of governing the City as a unique urban-rural surrounding, together with the redefinition of the levers of governing on the principles of de-concentrated concentration, democracy and autonomy with the emphasized appreciation of the public goods, on one side and free market on the other side.

The spatial conception of the City of Belgrade has been based in the Plan on: geographical and traffic position, geo- and bio-diversity, demographic potential, rural and urban settlement nets, power, industrial, food and tourist potentials, technical, social and sports infrastructure, net of cultural institutions, information capacities and connections of trans-border or trans-regional character. The organization and realization of the aforesaid spatial conception is envisaged by the Plan, on the relations city-city, city-village and village-village, as the urban system with the aim to induce its trans-regional and inter-regional dimensions. In the context of the trans-regional dimension, the significance of the organized correlation and cooperation of the City of Belgrade has been emphasized with the inner and outer surrounding on the basis of the spatial elements that connect them, but which also have their dynamics. Therefore, there are three levels of networking: the level of the metropolitan, the functional macro-region and the level of the European net of the cities. The operative tasks, the City of Belgrade is taking on, emphasize mainly the Danube orientation of Belgrade.⁸⁹ The inter-regional dimension of the spatial development results from the model of the spatial organization and development of the settlement net and centres from the Spatial Plan of the Republic of Serbia (1996), according to which on the territory of central Serbia, with all characteristics of polycentrism, the framework includes: the centre of the governmental and international significance - Belgrade, the macro-regional centres of Novi Sad and Kragujevac and many regional and sub-regional centres, whereof some are on the area of the Belgrade metropolitan (Pancevo and Smederevo; Ruma, Stara Pazova, Smederevska Palanka, Lazarevac, Mladenovac and Obrenovac). Belgrade, with its urban municipalities and emphasized suburban surroundings, is considered to remain the main bearer of the overall developmental flows, wherein the spontaneous use of building, agricultural and other land, i.e. the illegal construction of the residential, economic and other projects, will be prevented and redirected. The much clearer profiling of the minimum of the developing and servicing functions of the urban centres of the administrative area should lessen the internal daily migrations, speed up the development of the urban functions both in the centres and periphery and increase the significance of the rural centres in the developmental conception of the City of Belgrade.

Understanding the strategy of the regional development of the City of Belgrade meant undertaking the corresponding actions oriented aimlessly, including the following mu-

⁸⁹ It signifies the following: the co-operation with the Danube cities that make the framework of the Danube belt (Danube Belt City Hansa) by establishing the so-called Danube links; the prevention of the spatial degradation along the Danube; the promotion of the reconstruction and development of small urban wholes with the help of Centre for reconstruction of cities on the Danube (Urban Reconstructing Experience Pool); diminishing the significance of the administrative borders on the Danube, especially the one between the City of Belgrade and the AP Vojvodina, which will be supported by the formation of common multimodal knot (Belgrade-Pancevo-Smederevo) and the construction of bridge near Vinca; the integration in the European project of cultural paths in Podunavlje.

tually-connected developing levers: organizational-institutional, demographic, economic, socio-cultural and ecological. Moreover, the question of the regional development refers to its territorial differentiation on some specific developmental segments which are connected functionally, but the development and forms of which are not unique: the central business zone, the wider segment of the urban belt, the suburban area and the segment of the transitive and trans-active character. Establishing the Agency or Council for Regional Development is anticipated by the Plan for the needs of coordinating the actions concerning the regional development.

21.3.3. City of Belgrade Development Strategy

City of Belgrade Development Strategy, a document presented in a form of draft in May 2008 was elaborated by The Centre for Public Administration and Local Government PALGO, City management bodies and other non-governmental and public entities as well as international organizations and consultants. It was developed in coordination with the relevant strategies and strategic plans of the Republic and Belgrade, especially with Regional Spatial Plan of the Administrative Area of Belgrade and the General Plan of Belgrade, the relevant solutions of which have been incorporated in this document as an inherited obligation, especially in terms of infrastructure and transport. The Strategy is concerning the same territory as Regional spatial plan of 3.224 km² and population of 1.597.000 according to the 2005 data.

Its basic goal is to raise the City of Belgrade on the level of big European cities, as a capital in which the citizens will live prosperously, safely, and in a healthy environment, to develop a modern system of City governance with an emphasis on a new manner of financing, participation of citizens in projecting and achieving proposing directions and strategic priorities by 2012.

Synthesizing topics: a) economic development, b) social development, c) infrastructure, d) communication and transport, e) environmental protection, f) physical structure and identity and g) the City governance, have been grouped within the theme frameworks of environmental, physical, economic, social and development of the City governance with the consideration of their mutual impacts. Each of the mentioned topics were structured through their assessment, basic strategic goal and corresponding objectives and tasks, guidelines and instructions for the City for achieving it, as well as the concept and key principles. The method of partial synthesis instead of fully integrated method was applied, so that its implementation would impose a stronger sector obligation of the institutions, bodies and organisation of the City in achieving strategic priorities.

The document itself is structured in three parts: Assessment of the state of development of the City of Belgrade; Vision, goals and concept of future development of the City of Belgrade; and Strategic priorities - implementation measures and instruments 2008-2012. The text of the Strategy includes two comprehensive documents given as the document base: Report on the state of the City of Belgrade (2006) and SWOT analysis in an integrated form (2007).

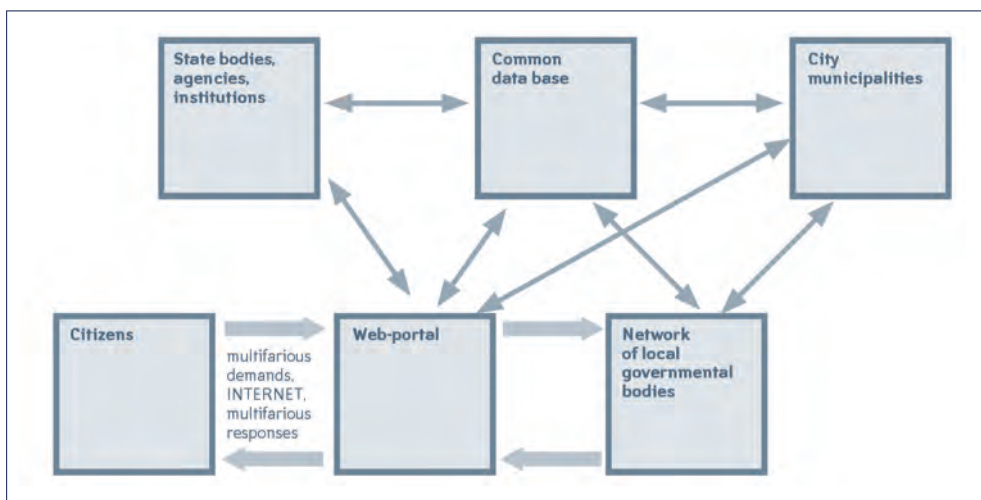
The Assessment of the State of Development of the City of Belgrade is covering the issues such as: demographic, social and economical changes, the state of environment, transport, technical infrastructure and land-use. This part is emphasizing the need for or-

ganized management of the City of Belgrade using instruments, such as the information system, the budget, tax system, land, utility, housing and other policies and instruments including the modernization and consistency at a greater level than present, administrative organization of what is called the metropolitan area of Belgrade, the issue of spatial and urban planning, as well as the relationship between the citizen and municipal (city) administration. Considering achievement of the goal - rising the significance and rank of the City of Belgrade among the capitals of Europe, aforementioned is seen as its main obstacle. On the other hand: human, geographical and natural potentials; crossing of the two out of ten European Corridors (VII and X with the leg extension X1); developed network of facilities of social and technical infrastructure with a high level of functioning; significant potentials of construction land and business space for the development of secondary, and especially tertiary activities; quality logistics of the quaternary sector; financial capacities and a network of institutions in many areas; spirit of the City based on spiritual, cultural, and intellectual potentials and network of urban centres, as its significant advantages and predispositions.

Dealing with the development issues, visible disproportions and incoherence in the development between the city and suburban municipalities and optimal use of valuable resources, values and potentials included in the territorial whole of the City are denoted as the major tasks of the Development Strategy of Belgrade.

The second part: Vision, Goals and Concept of Future Development of the City of Belgrade is defining the general goal – vision of sustainable development of the City of Belgrade as a high ranking metropolitan and capital of Central, East and South-East Europe, in line with parameters of sustainable economy and advanced technology, greater territorial cohesion of the City, greater level of accessibility, established polycentrism and decentralisation, and developed urban identity. Correspondingly, key principles of the City of Belgrade development are strengthening its sustainability, identity, competitiveness, cohesion, as well as promotion of the new mode of governing the City.

Figure 81: City of Belgrade e-governance chart.



Source: City of Belgrade Development Strategy.

Guidelines for achieving the goal were given to the City of Belgrade administration and all stakeholders involved in its development, such as to: redefine the deep historic foundations of Belgrade; use the exceptional geo-strategy for establishing links with other cities and regions in Europe, establish natural functional relations with neighbours and other regions within Serbia and in Europe; accelerate development of sustainable economy, with support to highly accumulative branches of economy, especially service sector; promote social development with special attention paid to education and jobs for young people, as well as elderly and vulnerable groups, promotion of public services, especially the system of culture and its institutions, sports and entertainment; protect, develop and promote natural and cultural heritage as the base of identity, appeal and economic development both of the City and Republic of Serbia; resolve key issues in all forms of transport, some of which have special importance and develop an integrated system of transport and telecommunications; resolve key issues of the most significant elements of utility systems, with an equal treatment of all parts of the City of Belgrade; develop awareness, a system of indicators, and significantly improve the environment, simultaneously paying attention to all its elements; promote the identity and physical structure of settlements with an emphasis on renewal, compactness, identity, mixed land use, greeneries, and especially the banks of Sava and Danube, central areas of the settlements and complexes of capital importance; promote understanding, development and construction of public areas and public assets, embracing the idea that the City as a whole is an asset important for all those living and working in it; enable new territorial organisation and polycentricism and essential decentralisation, with elements of regionalisation; achieve participation and horizontal coordination of all stakeholders and citizens in terms of major development projects; develop a new system of governance which will enable development of the City as a whole and its integral parts, with a special emphasis on a modern system of financing, budgeting and programming, as well as participation in the decision-making system; provide for further development of the emergency response system in case of natural disasters, as well as a system of personal and business protection of citizens and legal entities; support introduction and development of e-governance which will provide for greater transparency, efficiency and monitoring of development indicators and connections among the systems.

Aforementioned is concretized through the chapters relating: sustainable natural and living environment and improved identity of the City of Belgrade, economic development – made by local governments on the sustainable activities and communications, social development – promotion of physical and mental health of the population, institutional development – towards decentralisation, polycentricism and integrations.

In its final part: Strategic priorities 2008–2012, the Strategy is defined as neither optimistic nor pessimistic, but realistic and the uncertain legislative framework (territorial organisation, restitution, denationalisation, undefined incomplete legal solutions regulating local government) is identified as the main threat for the development of the City. Also, high horizontal and vertical capacity of the Strategy is predicted by saying that it will be the base for definition of sector strategies, revision or creation of new strategic plans and as a framework for defining strategic ideas or decisions territory of the City of Belgrade. In cooperation with the Republic, solutions from this Strategy will be the base for vertical coordination in composition of Republic strategies. The same is applied in case of horizontal coordination, activities of all stakeholders on the territory of the City of Belgrade, who will take the Strategy for the purpose of orientation and programming.

For making first steps in line with the set goals and objectives, strategic priorities, i.e. projects were determined, which may be implemented, launched or prepared for implementation in the period 2008-2012. Their identification was carried out through discussion with the current bodies and organisations of the City Council and citizen polls. After their identification, projects and priorities were grouped accordingly into 7 groups: natural and environmental protection; economic development; development of transport and transport infrastructure; development of technical infrastructure; social development; development of the City's identity; and institutional development and were given the completion deadline, sources of finances and responsible institution for their implementation.

As for the implementation of The Strategy as a whole is concerned, foundation of the new body - City of Belgrade Development Agency is proposed. This institution should be engaged in monitoring its implementation, controlling all significant development parameters, as well as cumulating knowledge and ideas which could possibly adapt the Strategy for future changes including preparation of annual reports on achievement of strategic priorities, which the Mayor will file once a year to the City Assembly. Thus, the Strategy will be subjected to permanent revisions, and every next City government will have the possibility to amend it, complement it, and revise it in line with the changed circumstances.

21.4. Concluding remarks

The strategic spatial planning in Belgrade and Serbia was revived at the moment of the country's weathering the crisis and the blockade. Due to the lack of continuity, the conceptual vision of plans was burdened with problems originated in the period of deregulation, i.e. in the last decade of the 20 century. The problems were, among others, in the large number of immigrants from inner Serbia and war regions of former Yugoslavia, extensive illegal construction, neglected infrastructure, the collapse of the vital city services and insufficiently integrated territory (centre and periphery relationship). On the other side, the planned solutions had to be based on the new economic and social concept: the ruin of the socialist country and planned concept of the country of prosperity, the introduction of market concept of economy based on the bared neo-liberalism, the demands that result from the introductory procedure to European Union, not to mention the repairing the consequences of the war operations in 1999. In spite of the mentioned changes and the changed institutional arrangements, the key strategic developing plans kept the elements of the continuity of the planned policies of the City development from the socialist period – the appreciation of the existent city construction, the continuity in planning the traffic and infrastructure, the city landscaping, etc. The new elements that have to be solved in the future refer to: unsolved land and building property relations, unfinished process of restitution and the ambition that Belgrade takes more significant place in the net of cities of Southeast and Middle Europe. The unsolved relationship between Belgrade and inner Serbia is for the future plans: the strategic documents on the country level continually stress the need for demetropolisation, bearing in mind the size and concentration of the functions and population in Belgrade in relation to the relatively unequipped and demographically endangered parts of Serbia.

The changed conditions and the fact that the great number of banks and insurance companies and other foreign companies started to ask from the city authorities the locations for necessary business, warehousing, production and other facilities, above the intensive housing construction, imposed the need for the urgent finding of the locations for the abovementioned purposes with solved property relations. The locations were found at the edged zones of the city, mostly on agricultural land or one of the central urban municipalities-New Belgrade, which had enough space for new construction due to the Le Corbusier way of building.

The overall result is that suburban parts became increasingly self-contained in functional terms and as such strongly compete with the city core. To continue this process, it will be necessary to make a shift in the planning and governance practice at both tiers, the local/communal and the regional/metropolitan.

However, the world economic crisis, which has been in full swing in the second part of 2008, and will not stop in the following period, emerges as a new important factor of the Belgrade strategic planning. There is a genuine fear that the majority of planned goals will be unrealized or their realization will be postponed for the more distant future. It especially refers to the decisions optimistically linked to the process of acceptance of Serbia into the European Union, where there is not enough enthusiasm for receiving the new members due to already mentioned crisis. Moreover, there is a real estimation that the key strategic plans will ask for the new revision in the near future for at least two reasons: the lack of foreign investment inflow in the period of the crisis and the internal financial collapse which has already caused the restriction of the developing budget of the City.

22. Roles of geoinformatics in spatial development of Ljubljana

Marko Krevs

The intention of this chapter is to briefly present the existing use of geoinformatics related to the spatial development of Ljubljana. Instead of exhaustive description and evaluation we seek for the perspectives, anticipating future possible directions of involvement of geoinformatics in the process of spatial planning and development of Urban Municipality of Ljubljana.

The use of geoinformatics in planning in certain administrative area is always a result of several historical and recent processes and decisions. Among the important factors in general are the availability and quality of relevant spatial data, the existence and effective functioning of a system of regional and urban planning, level of achieved geoinformatic literacy among people working in planning, on all levels of decision making and in certain circumstances (e.g. in participatory planning) also in general population in the area. Even in case of very favourable circumstances related to the mentioned factors, a poor support of e.g. local or regional government or managers in municipalities' administration may result in poor implementation of geoinformatics in the planning. On the other hand even in case of unfavourable conditions some excellent examples of geoinformatic applications in the planning may occur.

Geoinformatics is therefore not discussed as an isolated factor of spatial planning activities or spatial development. We rather see and evaluate it as a component part of e-governance and participatory planning contexts of the spatial development of the municipality. Modern participatory planning paradigm strengthens the traditionally weak part of the planning triangle, political and financial powers – technicians and science – inhabitants, by giving inhabitants increasingly numerous, diverse and influential roles in strategic, implementation and monitoring phases of spatial planning and management. To follow this process we shift the focus of debating geoinformatics from "traditional" counting of computers, GIS experts, databases and software licences for "doing GIS" towards more concrete, actual or potential, impacts of geoinformatics on spatial development.

Some elements of geoinformatics, either conceptual or technological, in form of e.g. data, analytic, visualization or dissemination tools, are nowadays probably used in every phase and on every level of the spatial planning process in Municipality of Ljubljana. This ubiquity of geoinformatics in the spatial planning makes its presentation and evaluation quite a challenge. Our approach is based on the following:

- recognizing geoinformatic elements in the publicly accessible results of the spatial planning in Urban Municipality of Ljubljana;
- identifying major geoinformatics-related players in Urban Municipality of Ljubljana;

- evaluating the existing use of geoinformatics in Urban Municipality of Ljubljana from the points of view of achieved stage of e-government (Ronaghan, 2002), development of selected aspects of e-governance (UNESCO, 2005) and citizen participation (Arnstein, 1969);
- anticipating future perspectives of geoinformatics in the spatial planning based on a cross-evaluation of the so far unattained e-governance goals and available geoinformatic functionalities.

22.1. On ideals of geoinformatic applications in the spatial planning

Developing an “ideal geographic information system” is hardly a meaningful or feasible goal for a municipality. Such expectations based on oversimplified understanding of what the use of geoinformatics or spatial planning should bring usually do not lead to successful projects (Tomlinson, 2003, xix-xx). A persisting belief that the growth of the quantity of available geographic data itself automatically means development of geoinformatics or even planning is also often misleading. Both geoinformatics and spatial planning should be planned and evaluated on the basis of their impact on “real life”, e.g. functioning of institutions, quality of life, preserving or changing the places. It is not the system (of information or of planning) that matters, but what it does, and at what costs.

Two different aspects of evaluation of the actual or potential impact of geoinformatics on spatial planning and management have been used. Firstly we try to evaluate how well the geoinformatics is used from the point of view of the technological and informatic perspective. Secondly we try to evaluate how geoinformatics contributes to the development towards participatory or synchronous planning and its implementation, including the perspective of user's (citizen's) “experience” within such processes.

The evaluation of the achievements regarding the first aspect of the geoinformatic effectiveness can be summarized on the basis of general knowledge about the quality of the applied geoinformation, the published planning results, the internal and external (geo) informatic teams or institutions involved, complemented with the information acquired during the interview with a representative of the informatics department of the Urban Municipality of Ljubljana (Stare, 2008) and of one of the major geoinformation providers (Veršič, 2008).

A very general evaluation of the achievements regarding the second aspect of the geoinformatic effectiveness, the contribution of geoinformatics to the developments towards participatory or synchronous planning and its implementation, can be based on a positioning of current situation in the Urban Municipality of Ljubljana against selected contexts in forms of “qualitative measuring scales”. This aspect of our evaluation is actually more related to the transformations of the underlying contexts of the spatial planning and spatial development than to the geoinformatic technology itself. While some authors define the ultimate goal of the development of e-supported spatial planning and managing activities as virtualization of the government, cyber planning or digital Agora (De Montis, 2006), some examples of “measuring scales” in a form of successive stages towards

the final goal can be found. A very general “gradation” of the stages of development of e-governance uses terms e-administration, e-services and e-democracy (UNESCO, 2005). E-governance refers to the performance of governance, including citizens’ articulation of their interests and exercise of their legal rights and obligations, via the electronic medium. The involvement of citizens in the process of governance at all levels is a very important aspect of e-governance, which is reflected also in the following “gradation” (ibid.):

- e-administration refers to improving of government processes and of the internal workings of the public sector with new ICT-executed information processes,
- e-services refer to improved delivery of public services to citizens (like requests for public documents, requests for legal documents and certificates, issuing permits and licenses) and
- e-democracy implies greater and more active citizen participation and involvement enabled by information and communication technology in the decision-making process.

It is obvious that spatial planning and management are intrinsically related to the governance, and geoinformatics contributes to implementation of the e-governance. Actually quite a wide field of development of geoinformatics, named participatory GIS (PGIS) or GIS for public participation (PPGIS, 2010; example in Hudson-Smith et al., 2003) focus on enabling the citizens’ active involvement in different kinds of activities related to the spatial development.

Alternative definition of the stages in the development of the e-government (and e-governance) uses the following “gradation” (Ronaghan, 2002):

- emerging: an official government online presence is established; information is limited, basic and static;
- enhanced: government sites increase; information becomes more dynamic; content is updated with greater regularity;
- interactive: users can download forms, e-mail officials and interact through the web; they can make appointments and requests;
- transactional: users can actually pay for services and other transactions online;
- seamless: full integration of e-services across administrative boundaries.

Somehow more elaborate, although still rather simplistic abstraction, is “Arnstein’s ladder” of citizen participation (Arnstein, 1969). It provides a useful way of “measuring” and expressing the level of public participation in the planning (Smith, 2006) on the basis of relation between the citizen (powerless on lower rungs of the ladder) and the government (and other “powerholders”). The ladder shows two-level gradation of the participation, briefly presented below (coarser level is marked by letters and the eight rungs of the ladder by the numbers).

A. Nonparticipation: real objective is not to enable people to participate in planning or conducting programs, but to enable powerholders to “educate” or “cure” the citizens.

- (1) Manipulation.
- (2) Therapy.

B. Tokenism: allows the citizens to hear and to have a voice. When they are proffered by powerholders as the total extent of participation, citizens may indeed hear and be heard. But under these conditions they lack the power to insure that their views will be taken into account by the powerful. When participation is restricted to these levels, there is no assurance of changing the status quo.

- (3) Informing.
- (4) Consultation.
- (5) Placation: simply a higher level tokenism because the ground rules allow citizens to advise, but retain for the powerholders the continued right to decide.

C. Citizen power: increasing degrees of decision-making clout.

- (6) Partnership: enables citizens to negotiate and engage in trade-offs with traditional power holders.
- (7) Delegated Power.
- (8) Citizen Control, citizens obtain the majority of decision-making seats, or full managerial power.

Finally, a brief look at the goals and experiences of Denmark’s approach to reach a goal of “being among countries that are best at utilizing the global digital transformation to create growth and wealth” (Arleth, 2006) can provide us with a proof that the above mentioned “ideals” can serve the real practice. Here are some of the more detailed goals in the project:

- to utilize the potentials of digital society across the state, regional and local levels of government;
- to organize the public sector in a more flexible and efficient way, with higher quality of service for the citizens;
- to create better and more efficient solutions for administrative tasks through the use of information and communication technology;
- to fully digitize the public sector, which should ensure that work processes oriented toward paper handling and manual control are reduced, while double and unnecessary work is removed;
- to reduce the costs in the public sector while improving citizen and company access to the public service;

- to define different stages in the process of digitalization of all major service areas and contacts, from basic information published on the web, through increased interaction, to high levels of direct public participation.

The starting point of the “project” has been the notion that public participation in the planning process requires well-developed communication between the authorities and the public. In the context of spatial planning and development, the internet and geoinformatics are bringing more and more options for such communication. E-government is one of the results, including a growing field of geoinformatic services. Another factor stimulating such communication is decreasing number of employees in the administration. By questioning themselves about the capability of citizens to adequately use such communication, especially the one based on geographic information, the researchers have come to some interesting findings. Experiences gained from teaching geographers and in other “spatially oriented” disciplines about geoinformatics suggested that the concept of geographic information (as opposed to maps), and the idea of layered information, have not been intuitively understood. But these internet-based services have become rather popular among those who have been their regular users, such as farmers (e.g. applying for subsidies or for permission to increase their livestock), agricultural consultants and property handlers. In comparison to “average citizens” these have some professional knowledge (beside the interest) which enables them to comprehend the substance and context of the information in the interactive map. Studies suggest that map-based services are popular among the majority of users as long as they are not too complex or too technically demanding. Improving the usability of the geoinformation-based web services obviously requires knowledge about the nonprofessional user’s understanding and use of geoinformatics. Since modern geoinformatic services are meant as a service for all the citizens in a certain area, and are supposed to replace the personal-based service, the advances in their usability by wider population in the last few years make the goals of this project even closer to realization.

22.2. Geoinformatics in Urban Municipality of Ljubljana: situation and evaluation

A look at several important contexts of the use of geoinformatics in Urban Municipality of Ljubljana can serve as starting point for our presentation of the current situation. Among the relevant contexts the following are briefly discussed: available geographic information, main players (internal and external to the municipality), generally attained level of technological development enabling the implementation of e-governance (on both sides, in the Municipality as institution and among citizens), level of knowledge and skills needed to effectively perform e-governance, including online geoinformatic tasks, and finally, a general sketch and evaluation of the use of geoinformatics in the municipality.

Geoinformatics is widely used in relevant phases of the planning, including the research activities supporting the planning, as well as in the data storage, management and distribution. There is no evident reason to be in doubts about high professional level of the use of geoinformatic technology in the planning or other activities related to the spatial development. However, there are some potentials for improvements in the field of geoinformatics in the municipality.

Extensive Slovenian national geoinformatic databases, including for example numerous territorial divisions, registers and cadastres, infrastructural, environmental, land-use, economic, and partly accessible⁹⁰ social and demographic databases, make a substantial backbone of the municipality's geographic information resources. Improved quality of some of the geoinformatic layers, mainly provided on the national level, could contribute considerably to the overall effectiveness of the geoinformatic support to planning and spatial decision making, for example the spatial accuracy and the reliability of the attributes in the land cadastre. In situation of abundance of geographic information there are still some missing that could add important basis for better informed spatial decisions, like a register of illegal dump sites, or a register of degraded or derelict areas as potential for new investments. On the other side, there are some databases of paramount importance for spatial development, like those provided by The Environmental Agency of the Republic of Slovenia (ARSO, 2010), with already mentioned legally unsettled relations to spatial planning and management activities, and consequently unclear responsibilities of the data providers (Veršič, 2008). The INSPIRE initiative (INSPIRE, 2009) is driving an important "background process" related to e.g. quality, interoperability, accessibility and usability of geographic information and services and should contribute to the quality of the national and local geoinformatic basis for spatial planning and development in the close future.

Another factor that might impede adequate development of the use of geoinformatics related to spatial development in the municipality might be a weak (geo)informatic department within the Municipality itself (as reported by Stare, 2008). Within the municipality Department for spatial management is responsible for the spatial planning, while several other departments (e.g. for real estate, environmental protection, commercial activities and traffic), offices (e.g. Office for development projects and investments) and the mayor himself considerably contribute to these activities. Geoinformatics seems to be quite a minor and dispersed field of work within the municipality, with only one person employed as "geoinformatic staff" (ibid.)⁹¹. Already this fact alone shows that geoinformatics has not been seen as one of the major informatic activities and instruments within the Urban Municipality of Ljubljana. The municipality extensively uses geoinformatic outsourcing to accomplish tasks like maintenance of the geographic information (e.g. by IGEA, 2003), designing and maintaining the public geographic information system URBINFO (by LUZ, 2004; 2006-2010) or preparing planning documents or providing the municipality with research results serving as a basis for planning activities (e.g. by Urban Planning Institute of Republic of Slovenia, 2010). This outsourcing might be supported by economic reasons, but can also limit the initiative within the municipality to mere coordination of routine operations advised "from outside" instead of leading it towards increasingly innovative use.

With recent advancements of web-based geoinformatic services the circumstances for effective implementing of e-governance have changed considerably in regions with highly

⁹⁰ Among the data sources with severe access limitations due to personal data protection, the social and demographic data from Statistical Office of Republic of Slovenia are probably the most problematic. Accessibility of data only for settlements, even for some more detailed spatial level units like statistical areas, usually do not present the demographic or social characteristics of the areas in an adequate spatial scale to allow well informed local spatial analyses, planning and decision making.

⁹¹ However, majority of approximately 50 employees, dealing with the planning activities in Urban Municipality of Ljubljana, are supposedly users of geographic information and geoinformatic services (Stare, 2008).

developed information-technological infrastructure, like Urban Municipality of Ljubljana (and Slovenia in general: Mašič, Vehovar, 2010). The citizens (the clients) do not need any sophisticated equipment with expensive and complex software, and months of geoinformatic training, to be able to access, visualize, sometimes even edit, analyse or respond to certain geoinformation accessible over the internet. On the other side, the municipalities as providers of the (geo)informatics services to the citizens need to deal with at least the following new aspects of their role in the advances in e-governance:

- their (geographic) information system is not in use only internally within their organisation, but now has to serve much wider and highly diversified public;
- web-communication demands new ways of delivering information in both directions, including authentication of the clients, and more content-related visualizations, queries or formalized discussions (e.g. remarks to a proposed spatial plan, response from the municipality, eventual concrete effects of this discussion to the discussed plan);
- new ways of communication and other (geo)information manipulation over the internet make new advancements in the democratization of the spatial planning and development at least informatically attainable; concerning the (geo)informatic conditions, participatory and synchronous planning are no longer only distant and non-realistic ideals.

Looking at the above mentioned changes it is quite clear that nearly all actual power of bringing advancements in e-governance is now in the hands of the municipality, and the state providing legislative and a part of the financial framework for enabling such developments. The citizens will only need to participate, if and when offered the chance. As in other cases of democratization, the participation will probably tend to be relatively low after the initial boom. But providing the belief that they can actually influence the spatial development, the citizens will presumably be willing to participate, especially regarding the developments in their local environment. The example from Denmark (Arleth, 2006) supports the mentioned assumptions: internet-based (geoinformatic) services are rather popular among those who have become regular users, where their level of education, age or professional field of work are not important factors any more.

The previous spatial plan of Urban Municipality of Ljubljana, from 1986, has been prepared and used in a traditional "analogous way". Although it has been digitised later on (by Urban Planning Institute of Republic of Slovenia, using Autocad and dBase), that modernisation of the data storage and presentation did not bring immediate or extensive effects on the planning activities or on the citizens' access to municipality's geographic information. In 2001 a preparation of a new digital spatial plan of the Urban Municipality of Ljubljana has started (in the framework of a project ONYX, supported also by the World Bank). In 2006 a non-official digital version (using ArcGIS, Oracle, SDE) of the plan has been made publicly accessible, named URBINFO (2006), while the analogous version of the document has still predominantly been used in the official practice (Stare, 2008). The new spatial plan (Odlok..., 2010), divided into strategic and implementation part, has become valid in October 2010, and its simplified contents is accessible in digital form on the internet (URBINFO, 2010).

The web-based geoinformatic service URBINFO functions as spatial and attribute query tool, enabling access to several geoinformation layers on e.g. cultural and archeological heritage, natural values, forests, agricultural land, water sources, land-use (Figure 82), morphologic and functional areas, areas of dispersed construction, areas of legalized construction, valid spatial implementation documents (and the documents in preparatory phase; Figure 83), special spatial measures like the right of preemption and measures of protection. URBINFO is quite up-to-date, with a delay of about 14 days after formal acceptance of a certain implementation spatial document (Stare, 2008). It may therefore serve as quite detailed and reliable source of information in the search or general appraisal of the locations for certain activities or land-use changes. It is expected that the planned use of this system should shorten the procedure for e.g. a building permit (ibid.).

Figure 82: URBINFO – Public spatial data information system of Urban Municipality of Ljubljana: an example of spatial query on land-use map.

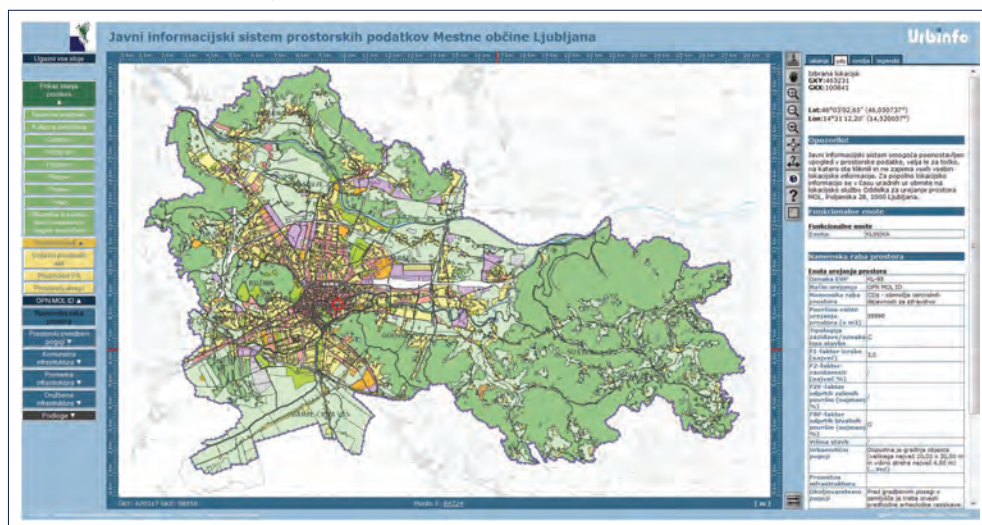


Figure 83: URBINFO – an example of spatial query on the map of planned spatial legal acts.



Source: URBINFO (2010).

The citizens of the Urban Municipality of Ljubljana have been invited to give their eventual remarks related to the proposal of the spatial plan (Novi..., 2009). The possibility to give their “e-remarks” has been enabled by a simple web-based application (Figure 84a). Majority of the collected remarks have been processed (Figure 84b), and the answers have been presented publically (Stališča..., 2010). However, only a detailed analysis of these answers would reveal the actual degree of success of citizens with the given remarks.

Figure 84: “Service for citizens’ initiatives” in Urban Municipality of Ljubljana is an example of a good practice of participatory e-governance: entering a new initiative is simple (a), response rate is very high, easily accessible and up-to-date (b).

a)

Servis pobude meščanov

Hitijski pomik karte na ulico (Izberite ulico in pritisnite na globus)

WOLFOVA ULICA

3

Statistike

Št. pobud: 2556

Št. odgovorov: 2536

Zadnje pobude

Zadnje objavljene

Zadnje odgovorjene

Izberite vrsto pobude *

Energetika

Naslov pobude *

Opis *

Source: Urban Municipality of Ljubljana (https://urbanizem.ljubljana.si/PobudeMescanov2/VnosPobude_Template.aspx#).

b)

Servis pobude meščanov

Domov | Servis pobude meščanov | Pregled odgovorjenih pobud

Izberite vrsto pobude: Vse pobude

Izberite obdobje odgovora: Zadnji teden, Zadnji mesec, Vse

Prikaži

19.11.10 Ureditve (odstranitve) grmičevja
19.11.10 Večja udarna jama
19.11.10 Drevede ob Linhartovi cesti
19.11.10 BIO KONTEJNER
19.11.10 Zabojniki za smeti
19.11.10 Vprašanje glede ureditve okolice
19.11.10 Postavitve prikazovalnikov prihodov
19.11.10 Prepoved vožnje vozil
19.11.10 Napaka pri odgovorjenih pobudah 16.11.
19.11.10 Potrebujemo otroška igrala
19.11.10 JAVNE DOBRINE
19.11.10 Notranja osvetlitev kazi okolice
19.11.10 Podrte cestne svetilke
19.11.10 Zaljubljeni hulgani
19.11.10 Ulica za vnos pobude

Število pobud: 44

Datum prijave pobude: 3.11.2010 11:49:57

Naslov pobude: Ureditve (odstranitve) grmičevja

Vsebina pobude: Lepo pozdravljeni! Prosim, da mi pomagate pri ureditvi zelenice, ki ni (tako pravijo) od nikogar. Okrog našega stolpca Hubadova 16 kosimo in urejamo grmičevje na lastne stroške. Trudimo se, da imamo lepo in urejeno, moč pa nas manjši trikotnik na vogalu nasproti trgovine Mercator. Tako vogal je zelo zaraščen, tudi s timovimi grmovji, kar je pa še huje, ko se pripelje iz parkinga je pregled na Hubadovo zelo oviran. Prosim za poz. rešitev. NO Tanja Majerle

Datum objave pobude: 3.11.2010 11:55:01

Odgovor pripravil: Oddelek za gospodarske dejavnosti in promet

Datum odgovora: 19.11.2010 9:30:35

Odgovor: Spoštovana, navedena zelenica je sicer v lasti Mestne občine Ljubljana, vendar ni opredeljena kot javno dobro, zato je Oddelek za gospodarske dejavnosti in promet ne ureja in ne vzdržuje. Kljub temu bomo v naslednjih dneh intervenčno obrezali moteče grmovje in omogočili nemoten pregled ozroma izvoz na Hubadovo.

Statistike

Št. pobud: 2556

Št. odgovorov: 2536

Zadnje pobude

Zadnje objavljene

Zadnje odgovorjene

Source: Urban Municipality of Ljubljana (https://urbanizem.ljubljana.si/PobudeMescanov2/PregledOdgovorjenihPobud_Template.aspx?ppp=odg).

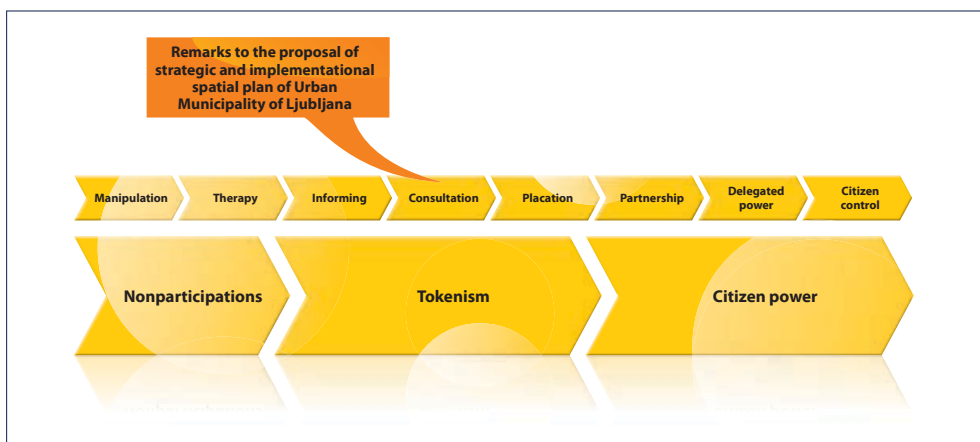
22.3. Perspectives and challenges of contribution of geoinformatics to e-governance and improved spatial development of Ljubljana

As a conclusion to the above presentation and debate we try to position the situation in the use of geoinformatics, and wider attained level of the e-governance in the Urban Municipality of Ljubljana, against the aforementioned steps of development of the e-governance and the citizens' participation level. From the point of view of the first of the "measuring scales", the development of the e-governance (as defined in UNESCO, 2005), including its geoinformatic contents and support, in the municipality is relatively successful in the field of e-administration, and partly in the field of e-services. There are some examples of practices towards more active involvement of the citizens enabled by (geo) information and communication technology related to spatial planning and develop-

ment, but the ideals of e-democracy seem still quite far from the current situation. From the point of view of the second “measuring scale” (based on Ronaghan, 2002), the e-government related to spatial planning and development in the municipality achieved completely the “enhanced level”, and gained some characteristics of the “interactive level” of the citizen’s participation.

It is hard to assert significant contributions of (geo)informatics to municipality’s climbing the “Arnstein’s ladder” of citizen participation (Arnstein, 1969; Smith, 2006) so far. As already mentioned, this climb is more related to the advances in the overall democracy, and the consequent level of citizens’ participation in the spatial planning and development, than to direct impacts of the technology and (geo)informatics. There are examples of good practices, like the aforementioned possibility for the citizens to give remarks in electronic form to the e-published proposal of the spatial plan of the Urban Municipality of Ljubljana. This example is still positioned quite on a low rung of the ladder (“consultation rung”; Figure 85), because the procedure offered no assurance that citizen concerns and ideas will actually be taken into account. But it presents the already existing possibility of the efficient use of (geo)informatic services in the spatial planning, leading to concrete, although mostly minor consequences in the actual spatial development. We can say it is a matter of understanding and belief of the municipality’s leadership that deeper involvement of the citizens into the spatial planning, and into supervising and influencing spatial development, could actually lead for example towards smoother and more transparent planning approval procedures, and above all towards better living environment for the citizens. In times of a deep crisis in spatial planning in Slovenia in general (Simoneti, 2010) such ideas may seem far from feasible in the close future. On the other hand, current situation, activities and appeals of professional associations and individuals related to the spatial planning (e.g. *ibid.*) might bring considerable changes, hopefully as resolute as in the above mentioned Danish case, into the ways spatial planning and spatial development are performed in the Urban Municipality of Ljubljana. The geoinformatic technology dedicated to servicing participatory planning (Hudson-Smith et al., 2003; PPGIS, 2010), including rich sets of geographic information, to enable such changes and the involvement of the citizens is already here.

Figure 85: Positioning citizens’ e-remarks to the spatial plan of Urban Municipality of Ljubljana on the “Arnstein’s ladder”.



Source: based on Arnstein (1969) and Smith (2006).

23. Geoinformation aspect of planning of Belgrade

Aleksandar Djordjević

Modern era is characterized by the amount and flow of data which is almost impossible to quantify. The significance of information and their effective changes represent one of the key developmental processes and one of the main characteristics of modern society.

It is clear that information represents important supposition of regular decision-making and, therefore, the need is being imposed that the means and sources of information are raised on the high level in the process of spatial planning. Those who are responsible for planning and programming the development of Belgrade, disregarding the segment for which they are competent, have managed clear, objective, qualitative and, if it is possible, concise information. If the information we have, satisfied the mentioned criteria, it could become "means by which we can influence the decision-making and directing certain events" (Marić, 1986). In accordance with modern, extremely dynamic, way of life and work in Belgrade, rapid technical and economic development in all spheres of human activities, the need for information becomes more and more obvious. The right information at the right moment can mean economic profit, prevent ecological problems, make life easier to residents of Belgrade and prevent ecological disaster. Such information becomes more and more necessary because managing the complex economic, legal, technical and social and other structures of the City cannot be imagined without them. According to Wahl (Wahl, 1971) "the success in managing depends to a great extent on the timely and qualitative information." The qualitative information is characterised by accessibility, completeness, exactness, clearness and flexibility, the possibility of check, objectivity and economy. Other authors explained the quality of information as "closeness of information on facts, real situation of a phenomenon or a process. If the information was more qualitative, it would be more true and real and, therefore, the possibility for making the right decision would be greater." It is often necessary to check many facts that spatial planners and city planners meet with every day, as well as many others who participate in the complex process of spatial planning of Belgrade, before they are accepted and implemented in planning solutions. An adequate and permanent check of planning solutions, the effective implementation of spatial and urban plans, as well as the permanent monitoring of changes in space and their (non) accordance with plans are only possible if we have qualitative information.

23.1. Geoinformatics in Belgrade spatial planning system

23.1.1. Why do we use geoinformatics in spatial planning?

The overall technological progress brought to the complexity of previously relatively simple systems and it made them more dynamic. Therefore, the activities such as following the condition of the system, changes in the systems, their analysis, as well as managing

such systems have become too much demanding and exceeded the mental capacities of a man. On the other side, modern technology, progressive software and hardware, have enabled the effective manipulation of data and information.

Spatial and urban planning have demanded large, constantly growing amount of different data and information. The further planned development of Belgrade demands data and information on the basis of which the prompt and right decisions can be made on spatial planning and management. Many domestic and foreign researches have pointed that the quality of starting data and information about the space and the existing content and activities in it have a critical influence for decision-making by which the development of space, quality and appliance will be directed regularly.

Information is more valuable if it enables to users (planners, city planners, etc.) better decision-making, more realistic plans and more effective control of their carrying out, and if it is possible the control in "real time". The control in real time means the capability of those who manage the space to find out and correct the deviations of the plan, or removing from the set goal (before those deviations become so much significant that they disable the realization of given goals), disable the return on the previous condition, or as the worst scenario, endanger the existing situation of space. It is insisted on a timely control that would point to the deviations from the plan or wrong planned decision at the moment when it is still possible to make some corrections. In dependence on the nature of the activity that is being followed, the eventual corrections do not have to be instantaneous, while sometimes it is not possible to carry them out instantaneously due to complex procedures of change of planned solutions. On the other side, there are activities where it is insisted on instantaneous reactions if the system has pointed to certain irregularities. Managing the network infrastructure in Belgrade could be an example, where there is a frequent need for removing damages that can endanger the safety of residents and the function of the whole area almost at one moment.

As Marić stated, "the realization of the control in the real time considerably enlarges the value of information because it enables the realization of the plan which is based on information and which, at the moment it has been carried out, represented the best alternative" (Marić, 1986). Therefore, the risk from the cumulative deviation from the plan, to which it can come during the development of the process of its implementation, can be reduced. Accordingly, the timely pointing out to damage on sewerage system, with its precise localization, can prevent damages on water system, telecommunication network and other infrastructural systems, set linearly and parallel under the ground, one close to another. Beside the positive effects that are accomplished in managing the space in a sense of making an image of the effective and responsible administration and its services, the economic effects have also been important at the saving of time during which the damage is noted, located and repaired, i.e. the positive economic effects of the protection of other infrastructural and traffic systems.

23.1.2. Who can use GIS in spatial planning process - only spatial planners?

Effective management of space of Belgrade as a complete system and all its subsystems through the process of spatial planning, has been caused by possessing the qualitative information as well as by the possibility of the rapid change of information between those who make decisions-make the spatial plans and those who carry out the decisions-

implement the solutions which are given in the spatial plans. Possessing the qualitative information makes the process of making the spatial plans more effective and reliable and, therefore, different planned solutions, i.e. the results of carrying out those solutions, define to which direction, in what way and by which dynamics the space of Belgrade is going to develop.

In different phases of making the spatial (and urban) plans, as well as the programmes of development of certain space, it is necessary to make different decisions (from the decisions in principle to the very precise ones). Whether planners, city planners, engineers, administrative organs and others who participate actively in forming the space of Belgrade will make decisions adequately, greatly depends on the quantity and quality of information they will possess, how they will apply the available information for formulating the suggestions and solutions and how they will explain their solutions based on the same information.

An extremely large amount of information, necessary for managing the space of Belgrade, has been located in different systems. Therefore, it is necessary to define which information we need, whether it is available and in which system, what is the format and quality and finally, when and how we can come to it. After gathering the information, it is necessary to systemize it and make further distribution. The way in which the distribution will be done, and also the form in which the information will be distributed, depends on whether the final user of information is one who makes the spatial or urban plan, the one who implements the planned solutions, or the one who follows their realization and controls the quality, deadlines, dynamics, etc.

The optimal solution means, on one side, the effective, qualitative GIS which is adapted to the characteristics of Belgrade space, but on the other side, it is adapted to the institutions, services and staff to which it remains for use and further advancement. Therefore, it has been pointed to two extremely significant characteristics of GIS that have to be esteemed at every moment of construction and implementation of information system, i.e. the need that GIS is optimized for the purpose and space to be used for and to be coordinated with the needs and knowledge of the final users.

23.1.3. Other users of GIS interested in problems of spatial development - citizens, politicians, local government?

One of many tasks of the local government of Belgrade is to insure the stable and qualitative services, by which it will provide the conditions for high health level of population, high level of population safety and it will satisfy other aspects, providing the high level of life quality in the City. These tasks are realized through everyday work of a series of services and departments within the local government, and in accordance with the adopted policies and directives. In developed countries, a many-decade use of geographical information systems within the local governments proved clearly that the effective use of geospatial information is the critical element in the realization of the mentioned task due to fact that the addressing of different combinations of factors that influence health, safety and the whole quality of life of the local community population has been based on geography, i.e. location. Knowing and understanding the location, the competences over it, the natural and cultural resources of the location, knowing the traffic and transportation flows, communal infrastructure as well as factors that can influence each of the

mentioned subsystems of the location, make the basis for managing the space of the local community and effective and qualitative servicing to its residents.

The present situation of the development of geoinformatics in Serbia and in Belgrade for the needs of managing the space of the local communities has been characterized by the individual users and projects that maintain their data on desktop computers which, in most of the cases, leads to the increase of unneeded data and applications. The aim of the implementation of distributed GIS is to introduce the interoperable technologies, standards and methods in such a way that they would enable GIS data and services to be used more effectively, reliably and rapidly. If the activities on the construction and implementation of GIS are coordinated by the organisations, the users of the spatial data can devote more time to the analyses of data and the use of the analytical possibilities of GIS while making decisions, but less time in searching the data, their coordination, unification and integration into the system.

23.1.4. What is the purpose of GIS in spatial planning process?

As Kenneth Boulding (1974) stated in his work *Reflections on Planning*, “the way world moves to the future is the result of some decisions, not plans. Plans are significant only as much as they influence those decisions. Therefore, planning can be defined as a part of the overall process of decision-making, but if it is not, then it becomes a bag filled with wind, a sheet of paper and a worthless diagram.” Whether it is a process of decision-making about or a process of making planning documents or programmes of development for a certain space, there is a need for easily accessible and qualitative information. The use of geoinformatics can enable exactly such systematically defined and selected, precise information. In dependence on the complexity of the space to which the information system relates to, i.e. the complexity of demands of one who is using it for planning, the system itself will have different levels of complexity. Disregarding the degree of the information system complexity, the access to information and the quality of information it should insure have to be at equally high level.

The automation of data processing in the spatial and urban planning represents the turning point in the ways of managing the space. It is clear that it is not about a simple technical promotion of the process of planning and programming, but it is about the influence on the methods of making planning documents and decisions, first of all by improving the whole fund of information. As Marić stated, “a man is trying to achieve the optimum solution by solving some of the problems. While deciding, the suppositions should be the alternative ones. Where there are no alternatives, there are no possibilities of choice either. If there is no possibility of choice decisions are made under pressure” (Marić, 1986).

On the basis of the analysis of the previous methods in making planning documents on the territory of Belgrade, the following characteristic phases can be recognised:

1. gathering, systematization and classification of data;
2. analysis of situation;
3. programme of a plan on the basis of needs, as well as urban indexes from plans of higher rank;
4. making a draft of a plan on the basis of alternatives and variants;
5. consideration and adoption of a plan.

It is clearly noticed in which phases the use of the qualitative information system can give its significant contribution of objectivity, exactness and scholarship. The first phase - gathering, systematization and classification of data, in the case of the use of geoinformational technologies for a certain territory for which a planning document is being made, would be made in advance and the information would be prepared in a form which is favourable to be used for a planning document. Modern geographical information systems enable to a great extent that the second phase - analysis of situation, is significantly advanced and accelerated as well as that certain alternatives and variants, through the usage of simulations and models, are examined before their implementation into planning document.

The mentioned possibilities of the use of geographical information systems in the process of making the spatial and urban plans and programmes of development represent only a part of wide spectre of possibilities offered by a qualitative information system. Besides the significant saving of time, necessary to make planning document, the advantages of using GIS in the process of planning relate to raising the degree of objectivity and exactness of the planning solutions as well as the overall quality of the planning document.

The subjects who participate in spatial planning are not always timely, enough and adequately informed on the issues on which the decisions are made, which reflects negatively on conceiving the planned solutions. Therefore, the solutions given in the plan have often been the result of intuition and experience of a methodologist and a planner, the so-called best-expert opinion. In the time of the 1990s, different changes in space of Belgrade (and Serbia as a whole) developed by various speed. Illegal changes developed extremely dynamically, but they were not treated by the planned solutions, while the legal ones, processed by planning documents, have been usually left unrealized. In such a chaotic and (un)organised space, there was no need to follow and analyse the changes every day, almost instantaneously. There were no official changes or they were very few, while the unofficial ones were neglected. Approaching to organised, legally structured society in Serbia, which directs its spatial development consciously, systematically and continuously, the need arises for permanent monitoring of the situation of different structures of space. Each of the actors in the process of managing, planning and programming of the spatial development faced with a bad condition of documentation on space. Most of the information was paper documents, unselected, unclassified and imprecise and it was often difficult to find them. Moreover, the information was not usually in accordance with the actual regulations and was never organised as a modern data base. The quality of such information was on very low level. The institutions did not have electronic equipment, especially computers and the result of such condition was irrational use of human and technical resources that cannot response adequately to the increased demands and needs (administration, investors, citizens, services, etc.) for information in accordance with the changes of system and organisation of the society. The equipment was acquired elementally and unplanned and it was not used adequately (often it was not used for purposes it had been acquired for).

The possibilities of information systems in planning and programming the development of space and its structures can lead planners, city planners and other actors who participate in that work to wrong conclusions concerning the role of geoinformatics in the whole process. Most often, the ignorance of its possibilities has been the reason for misunderstanding of its role. On one side, there is an unjustified fear that the automation of

data processing will limit or even stop completely the radius of activities, creativity and freedom of decision-making in the process of planning. On the other side, there are unrealistic expectations that by making the information system, an easygoing period will begin for those who are in planning and programming of the development of space and, therefore, the computers will make decisions and plans instead of themselves.

The qualitative information system will demand permanent and great work on gathering, classifying, processing and analysing the information, as well as on selecting and placing at disposal. The work will be facilitated by the automation of the procedure and less effort and time will be needed (less engagement of human resources). Moreover, it will enable the consideration of large number of alternatives and the decision-making on the basis of the qualitative information. It will also enable better insight and estimation of problems, prerequisites and possible consequences of some or collective decisions. Disregarding the possibilities that geoinformatics offer, a man will make a decision and he will be responsible for it. The necessity of constant interaction among information system, team that works on its maintaining and final users is clear.

23.1.5. What is the purpose of GIS in process of spatial plan implementation and process of monitoring of spatial changes?

Spatial planning on different levels should insure to modern society the coordinated ecological, economic and social development of space. The realization of planned solutions is enabled by different sorts of measures and instruments that can be called the segment of implementation. It is necessary to mention that the information system can show the equal value and all its appropriateness during the implementation of the planned solutions, i.e. the operationalisation of aims, ideas and visions, disregarding whether the plan is considered as something that have to be realized to the end or as the prognosis of something that can occur.

The problem of ineffective carrying out of the planned solutions the planners have faced with for many years can be approached from two angles. As observed from the angle of the plan making and defining the planned solutions, there is a question whether the solutions and plans are made adequately. Not going into the analysis of the methodology of plan making, the question is whether it was possible to make qualitative plans without adequate data and information, i.e. whether the applied methodologies could be sustained in further phases of working on the plan when the problem of lacking the updated cartographic bases, cadastre bases, various statistical indexes, lack of spatial entries for the whole series of available data and huge differences in de facto and de jure situation on the terrain has been well known. In other words, a large number of available data could not be spatially located neither precisely, nor even with large mistakes.

On the other side, there is a question of justification of great expectations from the process of implementation. Similarly as with the phase of making the planned documents, due to lack of the operative indexes and disability of monitoring the realization of the plan as a prerequisite for the analysis of the degree of realization, as well as due to non existence of competences to have that done, it has not been justified to expect that the decisions are made permanently by which the eventual deviations from the planned solutions will be corrected on time. Following the realization of plans, if it was done under that title at all, has related on establishing the existing situation without precise defining

the speed of realization and synchronisation in the realization of planned solutions. The new situation often related to newly built structures or changes in the purposes of areas, while the processes of the reconstruction and restoration of space were omitted or mentioned without evidence on the dynamics of the mentioned processes. Total reconstructions were the exception and their effects on space were equal to newly built structures. The processes of analysing the existing situation would start from the beginning in most of the cases, spending irrational time and money, while the analyses would often be incomplete due to limited budget. The use of updated geographical information system would enable the permanent insight in the changes in space and the realization of the planned solutions.

The aforementioned facts, as well as a series of other circumstances brought the process of planning and programming of the development of space into the condition it was found - unfounded planning and unrealizable process of implementation. It is clear that all problems can be removed by the use of geoinformatics, but with the construction of the qualitative information system, some of the problems of the process of making the planned documents and their operationalisation can be removed, so that planning stops being "the process that lasts too long, with too much paper and very few results, having as a consequence the inflation of planning papers, while the problems in space remain unsolved."⁹² Geoinformatics could be one of the strong connections between the planned solutions and the realization of the spatial and urban plans, enabling on one side, greater reality (objectivity and foundation on qualitative information) of planned solutions, i.e. change of the approach in making the planned documents, and on the other side, greater effectiveness of applying the instruments in the realization of the plan.

23.2. Organizational resources and importance of permanent education

How large the possibilities of modern information systems are and what is their significance in the process of managing the space and decision-making can be seen in the changes of organizational structures of some enterprises, changes in the organization of administrative organs, etc. Today, many state and some private organisations (as well as non-governmental sector) have organisational units (departments, sectors, etc.), the task of which is to change the previous traditional approach of data manipulation with the modern approach and to influence significantly the quality and speed of carrying out the tasks that are set in front of them through the use of geoinformatics. The process of transition from 'paper' managing to modern 'e-managing' along with a complete support of geoinformatics cannot be instantaneous and it is not deprived of technical, organisational and financial difficulties. Therefore, it is necessary to insist that the process develops gradually and it is most often insisted, in the transitional period, on the computer mapping and later automated mapping as the initial points of introducing the GIS technology. The extenuating circumstance at modernizing the process of drawing maps and plans is keeping the existing procedures, policies and programmes, because the already existing and developed processes and procedures have been automated.

⁹² According to conclusions of 30. congress of IsoRP, 1994.

It is clear that there must be changes in the way of the formation of (spatial) data bases, in the production of maps and plans as well as in the procedures of issuing the reports, obtained on corresponding inquiries. Beside the changes in the way of managing, it is necessary to begin with training of employed that has to be permanent task.

H. Prinz (Prinz, 1974) described concisely the aforementioned facts: "The introduction of data processing is not much technical-organisational task, as it is organisational-socio-psychological one. Without change of the way of behaviour of members of the system, the effective use of data processing system would not be possible, while changing the way of behaviour is the primary task of management."

The building and implementation of the information systems for the needs of planning and programming the development of Belgrade has to be followed by active participation of those who manage the urban subsystems-the management of public communal services, agencies, secretariats, etc. As Bulatović stated: "informing the management with the problem and significance of the spatial data on time means better perception and specification of users' demands for IS planner and better understanding of the significance of the system and results that can originate as a consequence, for management" (Bulatović, 2006). The same author pointed to the necessity of engaging all communal services which use spatial data in their activities (public communal enterprises, land development agencies, institutes of urbanism, city agencies, real estate cadastre centre, city authority, etc), in order that the whole system of the city authority evolves through the effective system of connection and distribution of information into a modern one from which the users of space can have benefits.

Users are especially significant element of GIS, i.e. those who work on the building of the information system (projecting and programming), those who implement GIS and those who use it. Without adequately educated work force, without a vision which level certain GIS has to reach and without great effort, work and devotion, only a small part of the potentials that GIS offers will be used. The question arises as to the justification of investments in such a project. The last phase would be programming and testing the system and staff training. The staff training is considered as especially significant for stable, successful and useful operation of the system. Otherwise, without adequate and permanent staff training, the information system will become useless very soon.

Živković also had similar views about users: "GIS technology has limited value without people who manage the system and improve and develop plans for its use in solving the problems of the real world. All staffs (professions) are the GIS users, starting from technical specialists who project and maintain the system to those who use it in their everyday work. The identification of corresponding GIS specialists in relation to the final users is often of the crucial significance for an adequate implementation of GIS technology" (Živković, 2001).

23.3. Recognition of stakeholders and best practice examples

23.3.1. Elaboration of important institutions on different levels (both city and state level)

While considering the key institutions, significant for the use of geoinformation technologies in the process of the spatial and urban planning of the territory of Belgrade, beside the leading spatial-planning and urban institutions, all those institutions that support the process of the use of geoinformation technologies in spatial planning by their activities, have to be taken into consideration. Therefore, the following institutions are the key ones for the use of geoinformation technologies in the planning of Belgrade:

- Belgrade Land Development Public Agency,
- City Authority,
 - Secretariat for Urban Planning and Construction,
 - Secretariat for Communal and Housing Services,
 - Secretariat for Traffic,
 - Secretariat for Protection of Environment,
- Institute of Informatics and Statistics,
- Institute of Urbanism Belgrade,
- Republic Geodetic Authority – Real Estate Cadastre Centre Belgrade,
- Military-Geographical Institute,
- Republic Agency of Spatial Planning.

Belgrade Land Development Public Agency

This Agency provides proposals of Programme for land development and construction of communal infrastructure facilities with financial plan, makes studies and analyses on economic justification, provides communal facilities and land development, makes all necessary bases and elaborates for land holding, forms the initial prices of land which is rented out, carries out the procedure of land holding and signs contracts with investors on the regulation of mutual laws and obligations, takes care on the protection, rational and restricted land use, manages the information basis on land, provides services of engineering, consulting and management within land development and construction of public facilities, works on the preparation and construction of Belgrade underground and all major facilities significant for the City, buys, sells and rents real-estates for the needs of land development.

Within the organisational structure of Belgrade Land Development Public Agency, there is a sector for marketing and informatics, where the departments of informatics and monitoring of the city planning projects and cataloguing are of the special significance. All sectors are mutually connected horizontally and the sector of marketing and informatics supports other sectors.

Geographical Information System of Belgrade represents especially significant activity from the aspect of use of geoinformational technologies in the process of planning and managing the space of Belgrade. The presentation of urban plans on the Internet page of the Agency has been one of the basic modules of using the established information system. Therefore, the easier insight in the planned urban and infrastructural contents within the scope of certain plan has been enabled to expert and broader public. Governed by an idea to present the current urban plans, the Agency is supplementing and improving the map of Belgrade continuously. By the most recent changes in the interactive map of Belgrade, the Agency has enabled users the easier searching and finding the urban plans on the basis of several parameters, such as the number of the official register, part of the name of certain plan or the name of municipality. Within the user interface, a new option, called "Plan searching" is added, where it is possible to enter certain criteria on the basis of which the search will be done and the list of plans will be acquired. By choosing a certain plan, one can acquire the data on the plan, while choosing the "zoom" option the user gets the enlarged survey of the chosen plan on the interactive map.

All plans of detailed regulation (over 80 plans), adopted and published in Belgrade Official Register after 2003, can be seen on the clear map of Belgrade. The plans are presented through different options of searching, while the insight in the contents of the plan is given in the PDF document. The complete interactive use of maps will be possible in the following period, considering that this form of giving information needs a constant improvement of the system. A detailed instruction on use is within the application.

All plans that were adopted before 2003 (i.e. before Law on planning and construction was in effect), but which have still been in effect as a whole or a part, will be available successively on the Internet page of the Agency.

The interactive map of the city of Belgrade is the map which enables all wanted structures of the city to be found. The plan contains all spatial units, streets with home numbers, important public services, etc.

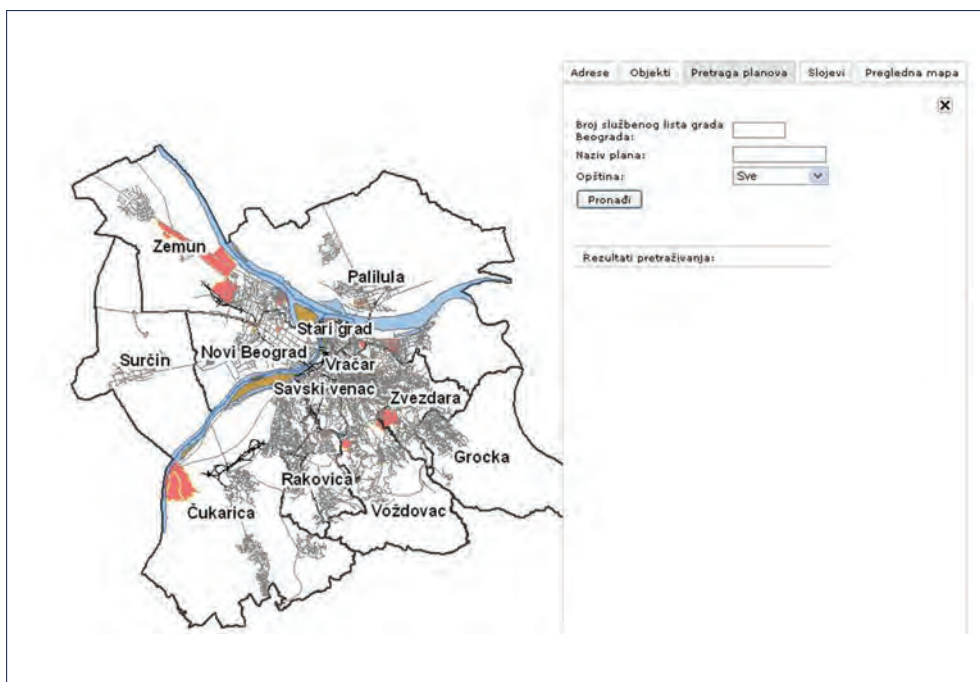
Since November 2007, when the Agency began the Internet presentation of the Interactive map with urban plans of Belgrade, some improvements have been made which, along with the changed user interface, enable the survey of the 2001, 2003 and 2007 orthophoto images, while the server platform has been modernized, which enables faster and more effective work.

Moreover, new tools for measuring distance and area are inserted in the graphical interface of the Interactive map, which makes the obtaining of necessary information easier. By choosing one of the tools ("measure distance" or "measure area") and by marking the wanted distances or areas on the map, the desired information is given in options window.

Examples of the user interface of the Interactive map with urban plans of Belgrade are presented in the Figure 86.

Figure 86: The user interface of Interactive map of Belgrade Land Development Public Agency.

a)



b)

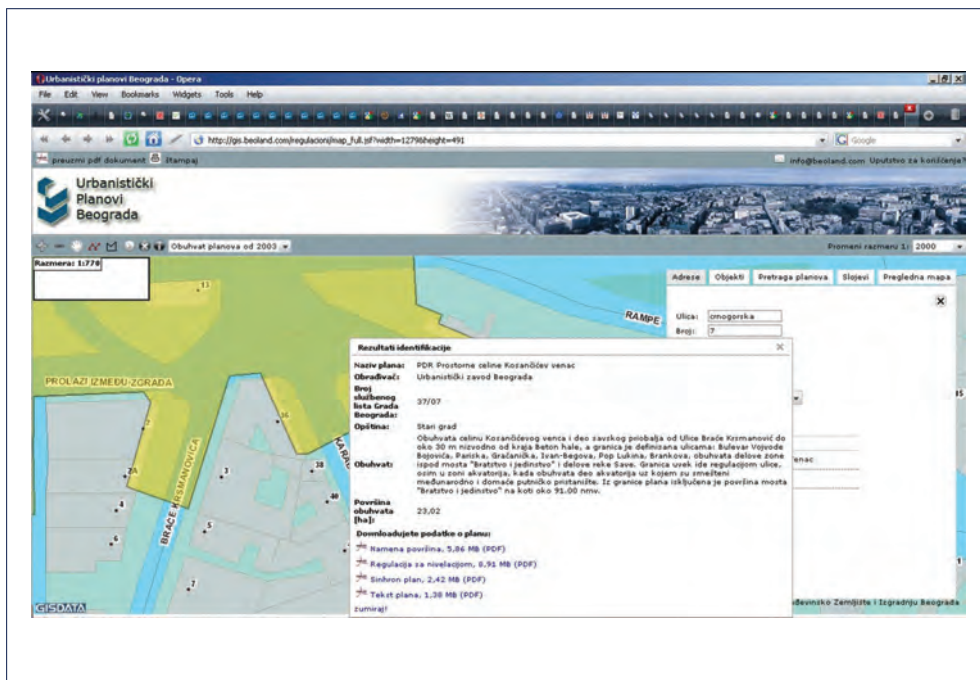
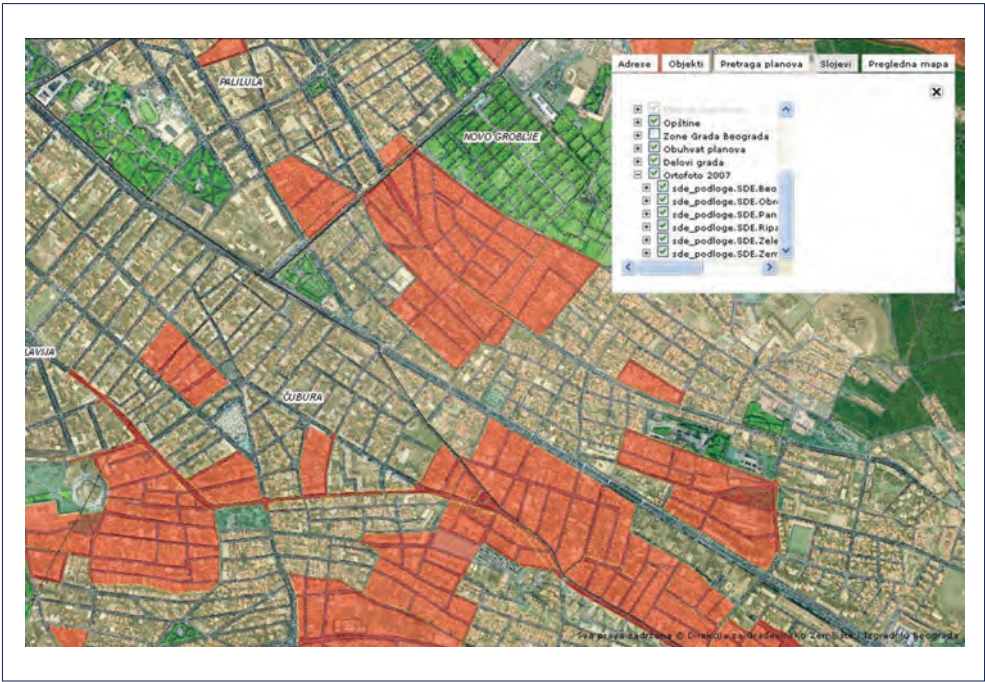
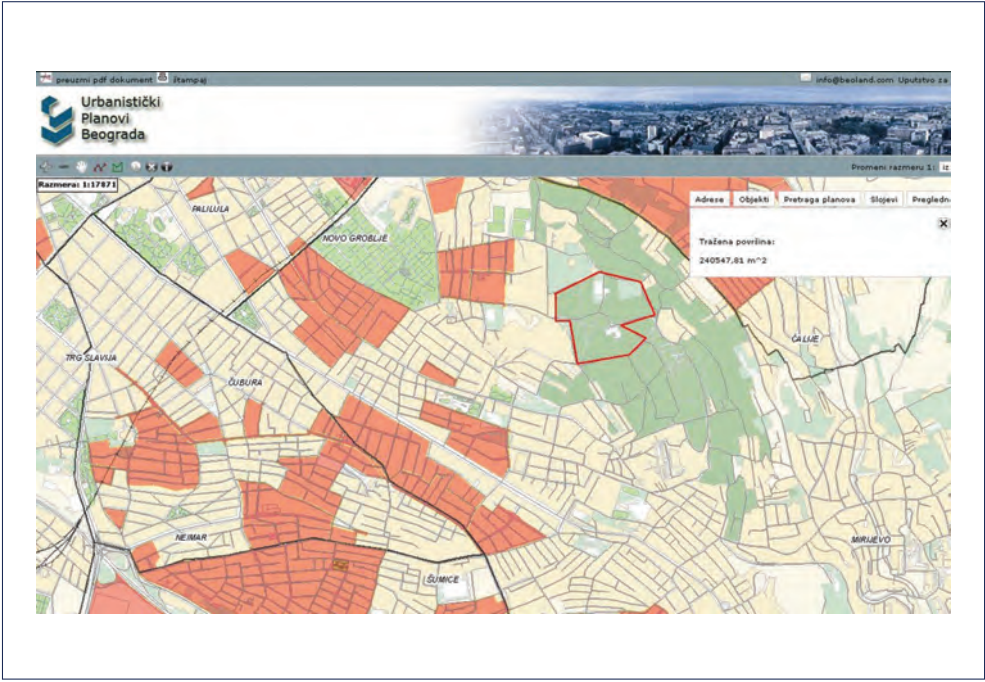


Figure 86: Continued

c)



d)



City Authority

Within Secretariat for Urban Planning and Construction of City Authority, there is a Department of urban plans development which is divided into Sections of 10 urban municipalities. This secretariat prepares, makes, files and saves planned documents and urban plans; issues certificates on reconciliation of urban projects and urban plans; issues urban plan certificates and acts on urban conditions; provides plans for setting the provisional structures on public areas and establishes type, size and look of those structures and structures of urban design; introduces the information and communication technologies in the sphere of activity of the Secretariat and provides other activities in accordance with law, statute of the city and other regulations.

The activities of the Department for documentation and informatics are gathering, filing and permanent saving of urban plans and documents, copying and issuing the copies of urban plans and introducing the information and communication technology in the sphere of activity of the Secretariat (ICT, GIS).

Within the Secretariat for communal and housing services which is significant participant in the process of implementation of the spatial and urban plans, but also the significant actor in gathering an extremely large number of data on the spatial situation of the City, there is a Sector for Informatics and Public Relations performing the following activities: organisation and activities on introducing and using the information technology in the interest of the Secretariat and the City; formation, maintenance and use of the specific data bases and information; data change and cooperation in the field of informatics with public communal services, administrative organs and other organs with an aim of forming the unique information system; making the expert-analytical material.

Secretariat for traffic represents the significant part of the City Authority as from the aspect of functioning so from the aspect of planning the development of the city. Department of information technologies operates within this sector, providing the activities of planning and developing geographical information system (GIS); activities of implementation of GIS in modelling the traffic system; activities on gathering, data processing and forming data bases for the needs of the Secretariat; providing and giving information to the media.

Department of informatics and public relations is within the Secretariat for Protection of Environment. Among many activities of this department, the following ones stand out: processing, systematization, data storing, quality control and other measures of the protection of the environment, public informing and giving data and information, publishing "Ecological bulletin" and other skilled activities in the jurisdiction of the Secretariat.

Institute of Informatics and Statistics has been especially significant part of the City Authority in the process of development and implementation of geoinformation technologies. The Institute is carrying out the following activities: enabling the conditions for more effective way of work of the City Authority and providing rights to citizens and economic subjects, uniting with the information system of the Republic, making plan and programme of development of the Unique information system for the City and urban municipalities, introduction, development and use of information technologies for the needs of the City, establishing the methodology, organisation and standards of the Unique information system of Belgrade, making the ideological, major and contractual

projects of the interest for the City, projecting, programming, maintaining and exploitation of data bases, etc. The institute also provides a series of other activities referring to plan and programme of development of the unique information system of interest for the Republic, expert coordination and collaboration, coordination and activity on introducing, developing and using the information technology for subjects of interest for the City, making, maintaining and use of common and specific data bases for the needs of the City and urban municipality, providing a range of public services, computer and communication equipment, establishing the development of methodological solutions in statistical researches of a special interest for the City, development of the statistical information base, organisation and carrying out the statistical researches on the area of the City, statistical analyses, information processing and announcing the results of the statistical researches, etc. The Institute represents the logistic basis for the implementation of geoinformation technologies and it can be considered as the bearer of the development of geoinformatics in the City of Belgrade.

Concerning the information-technical support to the City Authority, the Institute provides activities for using and maintaining means of automatic data processing for organisational units, creating the user profiles and defining rights of data accessing, setting and maintaining computer network, keeping evidence of information equipment with service interventions and other activities.

The unique information system of the city of Belgrade (UISB) includes all city administrative organs and all organs of 17 Belgrade municipalities. The rights on using direct access are strictly defined and controlled on the level of users (city organs, municipalities, public services, etc.).

Institute of Urbanism Belgrade

Institute of Urbanism Belgrade takes a significant place in the process of planned organisation of Belgrade. Even though it does not have the dominant role in the use of geoinformation technologies in the process of planning, the Institute makes a significant link in the process of improving planning, implementation and monitoring of the realization of planned documents by forming the methodological frameworks for the making of planned documents and leaning towards the institutions, mentioned as the leaders in the implementation of geoinformatics in the process of planning in Belgrade.

Republic Geodetic Authority

The analysis of the institutions which are of the significance for the use of geoinformation technologies in the process of spatial planning of Belgrade has to include some institutions of the significance for the Republic. The work of the Republic Geodetic Authority has been extremely important for further development of geoinformatics in Serbia, and in Belgrade. Simultaneously, RGA has been an important partner in the process of spatial planning. By establishing the GPS referent network, the RGA enables unique and homogeneous mathematical basis for all geodetic, navigation and other activities on the whole territory of the Republic of Serbia by which the use of modern geoinformation technologies has been enabled. By a series of activities such as the processing of analogue cadastre and geodetic plans; the making of digital cadastre and geodetic plans; aerial-photogrammetry; the processing of satellite images, the making of orthophoto

plans; the making of basic state map on a scale of 1 : 5000 and 1 : 10.000; the making of topographic and thematic maps, cartographic data processing of surveys, etc., the Republic Geodetic Authority has enabled considerable amount of data, significant for the process of spatial planning of Belgrade.

Military Geographical Institute

Military Geographical Institute (MGI) is the institution of the Ministry of Defence Serbia, engaged in research-developmental and productive activity in the field of geodesy, photogrammetry, cartography, geographical information systems, cartographic reproduction, metrology and other geo-disciplines. It operates within the Department of logistics of the Ministry of Defence. The significance of MGI in the process of spatial planning has been characterized by the production of different sorts of maps, plans, photo documents, astronomic-geodetic, geophysical, alphanumerical, statistical and other data, etc. Most frequently used products of MGI are: scanned and geo-referenced maps of scaled series (Gauss-Kruger coordinate system and UTM), scanned and geo-referenced maps according to elements (hydrology, relief, communications, etc.), scanned and geo-referenced aerial images, digital model of heights (dmh), digital geographic map on a scale of 1 : 1.000.000 (dgm 1000), digital topographic map on a scale of 1 : 300.000 (dtm 300). The digital topographic maps on scales of 1 : 250.000 (dtm 250) and 1 : 25.000 (dtm 25) are in the phase of making.

Republic Agency of Spatial Planning

Even though the Republic Agency of Spatial planning does not have developed and continual usage of geoinformation technologies, it has taken an obligation to develop the information system on the spatial situation of Serbia with the collaboration with other relevant participants of NSDI in Serbia and in accordance with INSPIRE directive. Certain already established methodological models in the process of making the spatial plans would be in that case supported by possibilities that geoinformatics offer.

23.3.2 Mutual Connections

The challenge of mutual collaboration of mentioned services, organs and organisations, their coordination in different forms and on different levels draw a special attention as the supposition of the unique geoinformation system functioning. In that way, the following phenomena would be avoided:

- the reuses of the existing and to a certain degree stored data;
- the phenomena of ignorance of the existing data fund;
- multiplication of gathered information;
- storage of identical information on different places;
- the phenomenon of different information on the same entities;
- non adjustment of form and scope of information to users' needs;
- complication and inaccessibility of analytic information and
- making (bad) decisions on basis of low quality information.

23.4. Conclusion

The previous analyses have pointed that geoinformatics is taking the significant place in the system of the spatial planning of Belgrade. Considering hardware and software components, it can be concluded that they do not represent the obstacle in further development and implementation of geoinformatics. The ways of data gathering, the organisation on the Republic and local level, as well as the quantity and quality of available data have made the qualitative basis for further development of geoinformatics and enabled its usage in the way that could in most recent times give adequate results. The circle of actual users is large enough, especially if the significance of users has been taken into consideration in the process of the spatial planning of Belgrade. The circle of potential users has clearly been recognized and it is necessary to make an adequate model of networking the functions of all relevant participants in the process as on the level of the City of Belgrade so on the level of the Republic. The necessary changes in the organisational structures of institutions, which are the key ones in the process of spatial management, have already begun, but the insufficient use of the staff-organizational structures can still be seen. Insufficient knowledge on the possibilities of usage of geoinformatics in the process of spatial planning, insufficient knowledge of GIS applications as well as the ways of making the planned documents, their implementation and monitoring on, today old, ways, represent the greatest obstacle in reaching the desired level in the use of geoinformatics. The change of the way of behaviour, i.e. the changes of the procedures of work of the participants in that process can be considered as the key moment for further development of spatial planning, supported by geoinformatics.

If suggested changes are implemented completely in the way of decision - making, geoinformatics can become the means with the help of which we can influence the decision-making and aiming at certain events. Moreover, they will enable an adequate check of planned solutions, effective implementation of spatial and urban plans as well as permanent monitoring of spatial changes and their (un)accordance with plans. Otherwise, they will make a series of incoherent components of certain system, acting uncoordinated. Hardware and software will become old, there will be a decline in quality of data due to tardiness, the potential users will not have sufficient knowledge and skills, and all will be surrounded by money spent irrationally.

24. Comparative synthesis of the challenges of spatial development of Ljubljana and Belgrade

Marko Krevs

Challenges of a development are terminologically characterized by a combination of “senses of difficulty and victory”. They imply the strength and will of the actors in the development process who optimistically look at the existing situation and trends, including the obstacles, and intend to act accordingly. In the comparative review of the challenges of spatial development of Ljubljana and Belgrade we focused on both, taking developmental opportunities and advantages, as well as successful solving of the developmental problems and avoiding the developmental obstacles into account. We did not intend to do a precise quantitative comparison focussing on measurable sets of characteristics of the cities and their wider regions, and developmental strategies and policies used to lead and monitor their spatial development. Such a benchmarking exercise, however tempting, would require quite some additional research work we could not afford to do. In this chapter we therefore relied only on the indicators measuring incentives or obstacles to the spatial development, accompanied by expert opinions, evaluations and eventual planning or policy suggestions provided by the authors in the book.

24.1. Strategic positions of the cities

Both cities are characterized by having exceptional physical-geographical, economical-geographical and political-geographical positions. Both have the roles of national capitals, which are related to their various primacies regarding their demographic, educational, economic, employment, scientific, cultural and other characteristics and possibilities. The developmental strategies of both cities count on the importance of their position in the junctions of important European transportation corridors (including navigable rivers in case of Belgrade), and their historical, present and potential incorporation into regional and wider international networks of cities or urban regions.

Until 1990s the development of both cities had been characterized by strengthening of their local, regional (level of republics within the federative Yugoslavia – former Yugoslav Federation), national and partly international roles. In the last decade of 20th century their directions of development dramatically broke up. Ljubljana became the capital of a newly established state that entered EU in 2004, three years later entered the “Schengen Area” and accepted Euro. In that period of time Belgrade lost its strategic position of a strong South-Eastern European capital, and was for nearly two decades excluded from the processes of the European cooperation and integrations. Most part of its economic

power and urban identity was also lost. Its slow recovery after multidimensional crisis is even further postponed due to the world economic crisis.

24.2. Physical-geographical factors

Several similarities between the two cities regarding the physical-geographical factors of spatial development can be found. Both are located by two rivers, and by a contact between flat land and somewhat elevated land. The flat lands contain the main resources for cities' drinking water supply, and are considerably consumed by extensive built-up areas resulting from the spatial growth of the cities. Even the areas endangered by the floods and earthquakes are not exempt from the mentioned urbanization process, especially in Ljubljana.

Several physical-geographical characteristics related to the spatial development of Ljubljana may be emphasized. The flat surface of the Ljubljana basin makes the construction of buildings and infrastructure, and also the pedestrian and bicycle traffic easier. The hilly ranges covered with thick forests penetrate into densely populated urban areas, which consequently benefit from local air circulation and possibilities for recreation in the "natural environment". Relatively abundant drinking water resources are available in the wider area of the city. The high level of physical-geographical heterogeneity due to the contact between the plain and the hilly areas, another contact between sub-Alpine and karstic (Dinaric) landscapes, and in a wider surroundings a contact between the plain and the mountains (the Alps on the north, Dinaric mountain Krim on the south) is less obviously related to the spatial development. For example the latter is not a direct factor of spatial development of the city, but intrinsically contributes to Ljubljana's geographic, and also visual and perceptual identity. Among the main physical-geographical obstacles for spatial development of Ljubljana are its location in a tectonic basin, lithological composition, the areas of groundwater and the threats of earthquakes and flooding. The location in Ljubljana basin results in frequently poor ventilation, temperature inversions, fog, increased air pollution, and makes the safety of the traffic and several aspects of the quality of life of the population worse. The basin location is also characterized by tectonic sinking, which is related to the threats of earthquakes, especially on Ljubljansko Barje (marshlands) and majority of other flatlands in the southern part of the city. Marshland additionally aggravates the construction of housing and infrastructure on these areas, and the threats of flooding are high there as well.

Among the physical-geographical characteristics that influenced, and still influence the spatial development of Belgrade, are the position near the confluence of two big rivers, erosion, landslides and torrents on the hilly territory south of the city, lithological composition, threats of flooding and protected areas of groundwater. The mentioned threatened hilly terrains have been intensively built-up, to a large extent illegally, in the last decades. The presence and extensive exploitation of natural resources, especially the lignite, in the vicinity of the city is its special spatial developmental challenge. In comparison with Ljubljana, Belgrade has less problematic situation regarding the earthquake threats, better air circulation and higher amount of insolation. The latter is seen as opportunity for complementary development in the field of energy supply.

24.3. The systems of settlements, demogeographic and social geographic characteristics and processes

The population living in the settlement (city) of Ljubljana represents about 13 %, the population of Urban Municipality of Ljubljana about 14 %, and the population of Ljubljana urban region about 25 % of the total population of Slovenia. The population living in urban area of Belgrade (i.e. the settlement of Belgrade, consisting of 10 urban municipalities) represents about 16 % and the population of the administrative area of the City of Belgrade (also referred to as the urban region of Belgrade) about 21 % of the total population of Serbia. In relation to the population of the country Ljubljana and Belgrade are quite comparable. But not in absolute terms: the population of the urban area of Belgrade is more than four times as large as the population of the City of Ljubljana, while the population of the administrative area of the City of Belgrade is nearly six times as big as the population of the Municipality of Ljubljana, and about three times as big as the population of Ljubljana urban region.

Although Ljubljana is one of the smallest capital cities in Europe, and the population in the city declined in the last two decades, it has strengthened its position in the national and international urban systems and networks of urban settlements. While the population has declined in the city since 1990s (the process turned towards slight growth after 2007), it has grown considerably in the wider urban region of Ljubljana, due to processes like suburbanisation, peri-urbanization, ex-urbanization or urban sprawl. However, despite the relative stagnation of the population in the municipality, the housing construction stays far behind the housing demand. Among the results of migrations towards the suburban fringe of Ljubljana are quite evident difference in the age of the population between the city and wider suburban areas (ageing index 135 for Urban Municipality of Ljubljana and 70 for Ljubljana Urban Region), inadequate distribution of public services and employment possibilities regarding the age structure of the population. The area and the population of the daily urban system and urban functional region have grown parallel with the intensified spatial interaction within these areas, especially the commuting to work and education (about 150.000 commuters daily) from the Ljubljana urban region to Ljubljana. The social-economic differences in the population and between the areas of Municipality of Ljubljana or Ljubljana urban region are quite moderate in comparison to the urban areas in other European countries.

As already pointed out, the relative size of Belgrade, compared to Serbian population, seems comparable to the relative size of Ljubljana within Slovenia. But studies of the systems of settlements and centres of Serbia show high level of centralization of population and functions, on national as well as on the level of the urban region of Belgrade. The strategy of polycentric development has been far from successful in Serbia, and resulted in excessive developmental lagging of medium sized regional centres behind the main centre, Belgrade. On the regional level the suburban centres are supposed to strengthen in the future to receive some of the functions of the main centre. Several aspects of demographic processes have been similar to those in Ljubljana, like the stabilization of the population growth in the city in 1980s and 1990s after few decades of steady growth, population decline in the city core and the population increase in suburban areas, and overall ageing of the population of the city (ageing index 103), especially in its core. Main

specificities of demographic processes in Belgrade are the negative natural increase even in the suburban areas and considerable contribution of war refugees to immigration in 1990s. The daily urban system of Belgrade is hardly comparable to the one in Ljubljana, already because of the spatial size difference between the cities. But even taking this aspect of comparison into account, the concentration of the daily migrations (estimated at more than 50% of the resident population) in Urban Municipality of Ljubljana seems considerably higher than in Belgrade. Social-geographical or ethnic-geographical segregation are not perceived as an important problem related to spatial development of the studied cities, although social areas analyses have shown some distinctive instances of segregation.

24.4. Economic-geographical, spatial-functional and transport transformations

Both studied cities are by far the strongest economic centres in their countries. In Ljubljana more than 20 % of the active population, 30 % of the total income and gross added value, and more than 40 % of the profit of Slovenia (Bole, 2008) are concentrated. Estimation of the GDP per capita (purchasing power parity method, PPP) for Slovenia is about 88%, for Ljubljana Urban Region about 125 % and for Urban Municipality of Ljubljana between 140 and 175 % of the EU27 average (Ljubljana..., 2010). Calculated on the basis of the data for 2008 (GDP..., 2009) estimations would be 20.680 €, 29.375 € and 32.900 – 41.125 € per capita respectively. Estimations of the GDP per capita (PPP, based on International Monetary Fund, 2010) for Serbia is about 2,7 times smaller than for Slovenia. The majority of the 190.000 working places (Statistični letopis Ljubljane, 2009) are concentrated in trade, public administration, defence, health insurance, construction, education and health care. Among all economic activities the business activities, services and trade occupy the biggest surfaces. Recent economic-geographic processes in Ljubljana are characterized by de-concentration of economic activities which move from densely built-up inner city areas to better accessible, less expensive and more adaptable suburban locations. Parallel to the de-concentration also inner city developments intensified, nearly exclusively based on private investments. Some of these investments, mainly focusing on trade, expensive housing and only rarely on other economic activities, are directed to derelict areas within the city.

Traffic in Ljubljana is characterized by excessive domination of personal car over other modes of transportation within the city (65 % of all the passenger traffic travels), and even more in wider urban region (90 % of all the travels). The public bus passenger traffic system has a minor role within the city, and even smaller in intercity travels in wider urban region. Railway passenger transportation has not been successfully included into daily circulation traffic so far. Bicycle traffic becomes increasingly important, and overtakes the development of relevant infrastructure for cycling and for its better integration into the overall traffic system. Considerable improvements of public passenger transportation and the mentioned cycling infrastructure will be necessary to move the development of the traffic into more sustainable direction.

Similarly as from demogeographic aspect, also in the economy Belgrade represents somewhat higher degree of centralization within Serbia as Ljubljana within Slovenia. In Belgrade there are about 30 % of workplaces, 35 % of GDP, 40 % of population with higher education and 40 % of the employed in service activities of the total figures for Serbia. Parallel to the predomination of tertiary and quaternary economic activities, also a noticeable presence and modernization of industrial and mining activities have been pointed out. Another specificity of Belgrade is its ability to meet the needs of the city population with the agricultural products. The process of economic-geographic de-concentration has resulted in decrease of predomination of the centre of Belgrade and Zemun in several economic activities, especially in trade. New Belgrade is becoming a new business and financial centre, while industrial activities continue to move to urban peripheral locations.

The international traffic role of Belgrade has been reduced to serve mainly the local and regional passenger and goods flows in the last two decades. Reviving this international role is therefore among the important developmental challenges of Belgrade. Among other developmental problems regarding the traffic the excessive concentration of workplaces in the city centre, partial mixing of local and transit traffic, lack of high capacity transportation modes in the main transportation corridors, extreme lack of the parking places, neglected and marginalized river traffic may be pointed out.

24.5. Pollution and environmental protection

To follow the principles of sustainable development, the spatial planning and development of Ljubljana will need to focus on the following goals pointed out in the book: to maintain the environmentally appropriate star-shaped urban layout, to balance the density of building and other environmental pressures with denser building along public transport routes, to preserve and increase the self-cleaning capacities, landscape and biotic diversity of urban and rural ecosystems, and to reduce the use of natural resources and the production of various emissions .

Several deficiencies, which can be understood as missed opportunities, but also as future spatial development challenges, have been emphasized regarding the actual situation of the environmental protection and sustainable development in Belgrade. A long list of these deficiencies, presented also in this book, should be an effective motivation for resolute action in spatial planning, governance, as well as in everyday life of the citizens. Let us hope that inclusion of Belgrade into the association of “healthy cities” shows the determination of the city administration “to do something about it”.

24.6. Strategic planning and spatial development

Strategic, long-term planning has been a very important way of spatial planning until 1990s in both cities. In the last decade of 20th century both cities have experienced considerable changes in the factors of spatial development. Increasingly important role of private investments and functioning of the real estate market have often led to

considerable deviations from the long-term plans of spatial development, and also from principles of modern urban design and management.

Overviews of the existing strategic spatial planning documents for Ljubljana and Belgrade confirm revitalization of the activities in this field. In Ljubljana its internationalization, and especially its new role of national capital city, can be viewed as trigger for returning of the strategic planning. For Belgrade even more reasons for re-establishing the role of strategic planning can be pointed out. Maybe the most obvious among the reasons are the devastating results of the multidimensional crisis in 1990s, like collective identity crisis, erosion of trust in the institutions, illegal construction in the wider urban region and even in the city core, and so called "kiosk urbanization". However, the world economic crisis may postpone the realization of strategic spatial planning as well as the processes of Serbia's inclusion into the processes of European integrations.

24.7. Information and communication technologies, geoinformatics and spatial planning and development

Geoinformatics is included in many ways into the preparation of the strategic and implementation spatial plans in Ljubljana and Belgrade and their urban regions. But it would be misleading to assert that geoinformatics considerably contributes to the quality of the whole spatial planning and development in the studied cities. Except in a few examples, the spatial planning and managing procedures are still predominantly carried out in a very traditional way. The opportunities for modernization of these procedures in the directions of e-governance and e-democracy, offered also by the geoinformation technology, have therefore been used only in a limited way so far.

Among the possibilities for improvements in the use of geoinformatics in the Urban Municipality of Ljubljana, the following can be pointed out: the improvement of the quality of some existing, establishment of some non-existent geoinformation layers (briefly specified in this book) and strengthening of the department of (geo)informatics at the Urban Municipality of Ljubljana. The latter could be related to more innovative use of geoinformatics in the direction of increasingly public-participation-oriented spatial planning and management. Two examples of "good practice" show that in case of Ljubljana it is not the technical equipment, or specific geoinformatic knowledge, which takes the spatial planning towards higher levels of e-governance and e-democracy. The true lever of changes lies in the belief of the municipal or regional government in the positive effects of active participation of the public in the process of spatial planning and development. Of course, the belief should be followed by relevant decision and implementation. The mentioned "good practices" may be a positive sign that the municipal government in Ljubljana decided to take the path towards democratic participatory spatial planning.

The use of geoinformatics in spatial planning and management in Belgrade, and in Serbia in general, experiences several problems, like the fragmentation of the institutions dealing with geoinformatics, lack of cooperation between them, interoperability (???) issues, duplication of activities, geoinformation and geoinformatic applications. The main players in the field of the geoinformatics and the spatial planning and management in Belgrade are pointed out in the book, as well as their activities in the field of bringing the

information from the spatial plan to the public via internet. However, further integration, systematization and harmonization of the use of geoinformatics in the spatial planning in Belgrade are necessary to bring true advancements in this field, and to avoid another example of “expensive but non-successful” implementation of geoinformatics.

24.8. Challenges of spatial development: a comparative synthesis

The authors of the chapters in this book have approached the spatial development of Ljubljana and Belgrade from different perspectives. Consequently they have emphasized different developmental problems and opportunities. Among these, some may be recognized as particularly outstanding. They could be named “synthetic challenges” because confrontation with each of them individually solves simultaneously several opportunities or problems of development, while confronting them all together includes majority of the challenges emphasized by the authors of this book. On a more general level, several challenges of development are quite similar for both cities, while when discussed on a more detailed level also the reflections of the differences in spatial development between the cities become more apparent. Among the “synthetic challenges of spatial development” the following may be emphasized:

- search for and realization of adequate economic, demographic and other “developmental contents” in the wider city core;
- solving the accumulated problems of unplanned, in Ljubljana mainly dispersed and in Belgrade mainly illegal continuous forms of urban sprawl towards adjacent or more distant suburban and rural areas;
- confronting the developmental challenges triggered by the ageing of the population of both cities;
- modernization of the system of urban and suburban passenger transportation based on a system of measures leading reliably towards important reduction in the personal passenger traffic by car and consequent substantial increase of the public passenger transportation and cycling;
- reduction or elimination of the negative impacts of previous examples of inadequate spatial development;
- preservation and improvement of the quality of the living environment and wider, also social and economic living circumstances, following the principles of sustainable development;
- assigning more adequate role to the strategical and implementational spatial planning on local and regional level in spatial development of the city and its urban region;
- inclusion of public into different phases of the planning and monitoring of the spatial development of the city, on the way towards democratization of (e-)governance in the cities and urban regions, with adequate support of geoinformatics.

Among specific challenges of spatial development of both cities, focusing on developmental opportunities and advantages, we may emphasize their advantageous strategic traffic and geographic position and strengthening of the regional planning and regional cooperation. In Ljubljana such additional challenges as strengthening the position of the city and urban region within international networks of the centres and regions, taking advantage of favourable characteristics of relief for further development of the cycling as increasingly important mode of the urban traffic, preservation of the star-shaped layout of the city, important from the aspects of the sustainable organization of transport and the quality of living environment of the population, improvements in the quality of surface waters and consequently of the groundwater, more reasonable use of the latter, and the gentrification of the city core may attract readers further attention. Examples of Belgrade's specific challenges are the improvement of the position of the city and urban region within international networks of the centres and regions, opportunities of the solar energy use due to favourable conditions regarding the number of days with sunny weather, inclusion into the European integrations and entering the European Union, and modernization of development of the transport infrastructure, for example the passenger river traffic and the cargo air traffic.

In the second group of specific challenges of spatial development related to successful solving of the developmental problems and avoiding the developmental obstacles in Ljubljana the following may be emphasized: the reduction of the existing natural threats to the existing built-up areas due to the earthquakes or flooding, redirection of further construction activities to less endangered areas, strengthening of the centres in adjacent or more distant functional hinterland of Ljubljana, consequential reduction of urban and suburban daily circulation of the population, improvement of the housing supply regarding the changes in quantity and quality of the housing demand, systematic (supported by media) decrease of negative stereotyping about certain urban and suburban neighbourhoods aiming at local identity improvements. Among examples of such specific challenges in Belgrade we may emphasize the reduction or elimination of the natural threats (mostly as erosion and landslide threats) to the existing, mostly illegally built-up hilly suburban areas, redirecting future housing construction to less endangered areas, reduction of inadequate infrastructure and services on the illegally built-up areas and the development of the mining in the vicinity of the capital city bringing as little as possible of the negative impacts on the spatial development of the city, especially on the traffic, air and water pollution and to the visual appearance of the landscape.

The above overview of the challenges is by no means complete. It is constructed on the basis of the selected problems and opportunities of spatial development of Ljubljana and Belgrade provided by the authors of the chapters in this book. Detailed challenges presented in the book are under a decisive influence of the spatial scale and the research orientations of the authors. The selection of the "synthetic challenges" presented above is a modest attempt to synthesize the comprehensive collection of the collected materials. But the selection of the specific challenges is intended only to present their diversity and breadth, characterized by which they present themselves to the spatial researchers and planners, decision makers, government and finally the population of Ljubljana and Belgrade. The readers of this book should be aware that challenges of spatial development are intrinsically multidimensional, and several instances may be out of the reach of the research focus and knowledge of geographers and spatial planners, and of the

authors of this book. Maybe the readers, especially if coming from other disciplines, will get a feeling that the challenges discussed in this book are very general, broad scale, far from everyday real life situations, and from the problems they may experience in their concrete living environments. We do not deny the importance of other developmental challenges, focusing on other aspects of development, or perceived on a more detailed spatial level. But in the practice of spatial planning and monitoring, on local or higher spatial level, the opposite situation happens just too often: perception and solution of a concrete problem in certain area may overlook the framework of the problem, and its eventual conflict with the long-term spatial development of a wider area.

The authors of this book have decided to prepare it in English language. The aim of such decision has been to make the information on and opinions of the authors about the situation and perspectives of the spatial development and its planning available to international public. Due to financial and time limitations we have not been as successful as we wished considering the quality of the language used in the book. But we believe that the collected texts and other presented materials, including the used and listed references, will serve the reader as a valuable document on spatial development and planning of Ljubljana and Belgrade at the beginning of the 21st century.

25. Izzivi prostorskega razvoja Ljubljane in Beograda

Marko Krevs

Ali nista Ljubljana in Beograd preveč različna, da bi ju mogli primerjati? To je bilo spontano vprašanje večine avtorjev v času, ko smo v sklopu dejavnosti bilateralnega projekta »Vloga strateškega planiranja, primerjalnih podatkov EU in GIS za prostorski razvoj srednjeevropskih mest: primer Ljubljane in Beograda« začeli razmišljati o pisanju te knjige. Odgovor na vprašanje podajamo avtorji sami, s knjigo, ki jo imate v rokah. V tem poglavju v slovenskem jeziku povzemamo in kolikor dopušča primerljivost zbranih gradiv sintetiziramo glavne ugotovitve zapisane v predhodnih poglavjih.

Pred vami je dokument časa v življenju obeh mest in vsebuje časovni presek novejših raziskav Ljubljane in Beograda, v katere sta bili vključeni sodelujoči ustanovi, Oddelek za geografijo Filozofske fakultete Univerze v Ljubljani in Geografska fakulteta Univerze v Beogradu. Uredniki in avtorji se zavedamo, da v enem delu ne moremo obravnavati vseh pomembnih dejavnikov prostorskega razvoja Ljubljane in Beograda ter njunih vplivnih območij. Med cilji si nismo zadali izdelave novih prostorskih razvojnih načrtov, sistematične kritike obstoječih prostorskih strategij in dokumentov, ali sistematičnega opredeljevanja razvojnih težav in izzivov. Podajamo razmeroma tipično geografsko in prostorsko-načrtovalsko širok in celovit pregled zgodovine prostorskega razvoja obeh mest, njunega prostorskega načrtovanja ter njunega dejanskega prostorskega spreminjanja. Avtorji med drugim soočamo načrtovanje in konkretne primere prostorskega razvoja, podajajo kritična mnenja o njunem ujemanju in morda še pogosteje o razhajanju ter se z zapisanim ozirajo tudi v prihodnost prostorskega razvoja Ljubljane in Beograda. Pri pisanju je večja pozornost namenjena tematikam, ki so jih avtorji obravnavali v svojih raziskavah. Tudi prostorsko merilo obravnavanih mest, ki praviloma zajema sami mesti ter njuni ožji in širši vplivni regiji, deloma vpliva na izbor in podrobnost obravnavanih vsebin. Med obravnavanimi vsebinami so na primer fizično-geografski dejavniki razvoja, položaj obravnavanih mest v sistemu naselij in središč, demogeografske značilnosti in procesi, dnevna mestna sistema, socialna mestna geografija, ekonomska geografija, prometna infrastruktura, prostorsko-funkcijske spremembe v metropolitanskih območjih, okoljske razmere, strateško načrtovanje ter geoinformacijska podpora načrtovanju in prostorskemu razvoju mest. Poglavja so praviloma pripravljena vzporedno, eno za Ljubljano in naslednje za Beograd, namenjena obravnavi sorodnih vsebin. Takšen sistematičen in celovit pristop daje knjigi monografski značaj.

Med obravnavanimi mestoma in njunima vplivnima območjema je mogoče izpostaviti vrsto razlik: v fizično-geografskih značilnostih, politično-geografskih vlogah, velikosti, demogeografskih, socialno-geografskih ter gospodarsko-geografskih razmerah in procesih. Razlikujeta se z vidika njune zgodovine, načrtov prostorskega razvoja, razmerij do sosednjih središč in regij, fiziognomije, mestne funkcijske sestave, okoljskih težav ter dejanskega prostorskega razvoja. Vendar izpostavljanje razlik lahko povzroči, da spregledamo sorodnosti, osredotočanje na prostorske načrte pa, da ne opazimo dejanskih prostorskih procesov. Pretežni del vsebine v knjigi je umeščene med omenjene skrajnosti – med pros-

torske načrte in spremljanje dejanskih procesov v pokrajini ter med obravnavo različnosti in podobnosti med mestoma. Avtorji želimo pokazati, da kljub razlikam med območjema obstaja vrsta razlogov za izmenjavo informacij, mnenj in izkušenj ter za medsebojno sodelovanje med raziskovalci, načrtovalci in upravljavci obeh mest.

Ljubljana je v knjigi obravnavana v različnih prostorskih »merilih«, od manjših območij znotraj mesta do Ljubljanske urbane regije ali še širše »metropolitanske regije«. Najpogosteje Ljubljano predstavimo z Mestno občino Ljubljana (MOL). Beograd večinoma predstavimo kot mestno območje, tudi »naselje Beograd«, sestavljeno iz 10 mestnih občin, ali kot mestno upravno (administrativno) območje Beograda, sestavljeno iz 17 občin.

25.1. Strateški položaj mest

Avtorji te knjige (že v uvodnih poglavjih Pak in B. Tošić, v nadaljevanju pa tudi drugi avtorji) in pripravljavci prostorskih načrtov izpostavljajo številne strateške prednosti Ljubljane in Beograda, ki so na primer posledice njunega fizično-geografskega, gospodarskega ter politično-geografskega položaja. Obe mesti sta prestolnici držav ter prebivalstveni, gospodarski, zaposlitveni, znanstveni, univerzitetni in kulturni središči. Razvojni strategiji obeh mest izpostavljata njun izreden strateški položaj na križišču pomembnih Evropskih prometnih koridorjev ter njuno zgodovinsko, sedanjo in predvideno prihodnjo vključenost v medregionalne in mednarodne mrežne povezave med mesti ali mestnimi regijami.

Ljubljanska kotlina leži na stiku alpskih, predalpskih in dinarskih pokrajin, kar se odraža v izjemni pokrajinski pestrosti samega mesta in širše mestne regije. V Ljubljanskih vratih je križišče V. in X. evropskega prometnega koridorja, kar po eni strani poudarja izjemen središčni položaj mesta znotraj Slovenije, po drugi pa povezanost Ljubljane in Slovenije z gospodarsko pomembnimi evropskimi regijami. Položaj in zgodovinski razvoj sta Ljubljani omogočila oblikovanje močnega in obsežnega gravitacijskega zaledja, ki z nekaterih vidikov zajema celotno ozemlje države.

Beograd leži na stiku panonske kotline in hribovite Šumadije, ob sotočju dveh v tem delu Evrope pomembnih plovnih rek, na stiku Srednje Evrope in Balkanskega polotoka ter na križišču VII. in X. čezevropskega prometnega koridorja. Poleg središčne vloge znotraj Srbije je Beograd izrazito prebivalstveno, gospodarsko in prostorsko naraščal tudi zaradi strateške vloge prestolnice v kraljevinah SHS in Jugoslaviji ter v Socialistični Federativni Republiki Jugoslaviji.

Do 1990. let je razvoj obeh mest potekal v smeri krepitve njunih vlog, zlasti na lokalni, regionalni (republiški), državni in deloma tudi na mednarodni ravni. V zadnjem desetletju 20. stoletja pa sta se smeri njunega razvoja dramatično razšli. Ljubljana je postala prestolnica nove države, ki se je s hitrimi koraki vključevala v evropske integracije. Beograd pa je v tem času izgubil svojo strateško vlogo močne jugovzhodno-evropske prestolnice in bil za skoraj dve desetletji izločen iz procesov evropskega sodelovanja in povezovanja. V tem času je izgubil večino svoje gospodarske moči in mestne identitete, njegovo počasno okrevanje po dveh desetletjih mnogorazsežnostne krize pa še dodatno upočasnjuje svetovna gospodarska kriza.

25.2. Fizičnogeografski dejavniki

Med fizičnogeografskimi dejavniki, ki so v zgodovini in bodo tudi v bodoče najmočnejše vplivali na prostorski razvoj Ljubljane, lahko na podlagi poglavja D. Ogrina izpostavimo zlasti reliefno izoblikovanost, tektonsko ugrezanje Ljubljanske kotline, kamninsko zgradbo, poplavnost vodotokov in območja podtalnice. Pretežni del poselitve se razprostira na ravninskih območjih južnega dela Ljubljanske kotline. Severno od Ljubljanskih vrat leži Ljubljansko polje, ena najgostejše poseljenih pokrajin v Sloveniji. Ljubljansko polje je razmeroma uravnano prodno in konglomeratno površje, ki je sicer z vidika nosilnosti tal ugodno za poselitev, vendar so tam območja poljedelske rabe tal ter območja podtalnice, ki je glavni vir pitne vode za širše območje Ljubljane. Na Ljubljansko barje, južno od Ljubljanskih vrat, se je poselitev izdatneje razširila šele po drugi svetovni vojni. Gradnja je tam zaradi slabše nosilnosti tal dražja, bolj tvegana pa je tudi zaradi večje ogroženosti zaradi poplav in potresov. Zaradi slednjega intenziviranje širjenja poselitve proti Barju v zadnjih nekaj desetletjih sproža utemeljene pomisleke, ki so jih podprle tudi obsežne poplave v septembru 2010. Kljub regulaciji Save, izgradnji Gruberjevega kanala in obsežnim izsuševalnim ukrepom na Barju (z več kot 600 km izsuševalnih jarkov) se poplave še vedno dokaj redno pojavljajo na Barju, občasno tudi na južnem obrobju strnjenegega mesta.

Za območje Ljubljane je značilno redno pojavljanje šibkejših in občasno tudi močnejših potresov. Skupaj z Zgornjim Posočjem sodi med potresno najbolj ogrožena območja v Sloveniji. Kljub temu, da imajo ti potresi večinoma razmeroma majhno magnitudo, lahko zaradi plitvih epicentrov povzročijo veliko škodo. Po mikrosezmični regionalizaciji sta potresno najbolj ogrožena Ljubljansko barje in prehod med Barjem in Ljubljanskim poljem v Ljubljanskih vratih, kjer leži tudi središče mesta.

Podnebne razmere so morda na videz manj neposredno povezljive s prostorskim razvojem mesta. Vendar dejansko močno vplivajo na kakovost življenja tamkajšnjega prebivalstva. Obenem pa širjenje in zgoščanje pozidave vplivata na lokalne podnebne razmere. K izrazitim povezavam med prostorskim razvojem in podnebnimi značilnostmi so v Ljubljani ugotovljene značilne poteze mestnega podnebja kot so mestni toplotni otok, nižja vlažnost zraka ter šibkejša prevetrenost, ki je tesno povezana z močnejšim onesnaženjem zraka. K slednjemu pripomore tudi pogost temperaturni obrat, ki ga običajno spremlja megla ali nizka oblačnost. Za sicer šibko, a z vidika zmanjševanja onesnaženja in zniževanja temperature zraka v Ljubljani izredno pomembno lokalno kroženje zraka so odločilni ustrezo razmeščeni zeleni koridorji v mestnem tkivu. Ohranjanju tovrstnih zelenih površin je potrebno pri načrtovanju prostorskega razvoja mesta nameniti posebno pozornost.

Med prednostmi z vidika prostorskega razvoja Ljubljane lahko med fizičnogeografskimi dejavniki izpostavimo reliefno »umirjenost« poseljenih območij, kar med drugim prispeva k možnostim razvoja kolesarskega prometa. V sicer z lokalnega podnebnega vidika neugodnih kotlinskih razmerah so izredno pomembna območja zelenih površin, ki se bodisi preko nižjih vzpetin predalpskega hribovja, ali na ravninskih predelih mesta zajedajo globoko v mestno tkivo ter prispevajo k izboljšanju mikro-podnebnih razmer, posredno prispevajo k zmanjševanju onesnaženosti zraka ter predstavljajo pomembno rekreacijsko površino za prebivalce Ljubljane.

Na prostorski razvoj Beograda so v že v preteklosti in bodo predvidoma tudi v prihodnje vplivali predvsem naslednji fizičnogeografski dejavniki (Obradović-Arsić, Filipović): lega na območju sotočja velikih vodotokov, Donave in Save, erozijski pojavi, zemeljski plazovi in okoli 160 hudournikov na vzpetem južnem obrobju mesta, kamninska zgradba, poplavnost vodotokov in območja podtalnice. Zanimivo je, da se kljub izpostavljanju pomena lege ob sotočju velikih rek mesto ni v večji meri »spustilo« do rečnih bregov. Med razlogi je gotovo tudi poplavna ogroženost, ki je največja ravno v aluvialnih ravninah, zlasti na mokrotnih območjih severno od Donave, a tudi v nižje ležečih predelih starega mestnega jedra, na primer okolica železniške postaje. Poleg poplavne ogroženosti so najpomembnejši omejitveni dejavnik za širitev mesta usadi in zemeljski plazovi, zlasti na območjih južno od Donave in Save.

Aluvialne ravnice Donave, Save in Kolubare so bogate s podtalnico, ki predstavlja najpomembnejši vir pitne vode Beograda. Večje težave pri oskrbi z vodo lahko povzročijo sezonska nihanja v pretoku rek in s tem v količini razpoložljive podtalnice. Ob nižjem vodostaju dodaten problem predstavljata na primer tudi segrevanje rečne vode po njeni uporabi v hladilnem sistemu termoelektrarne v Obrenovcu ter njena uporaba za potrebe rudarjenja v rudarskem bazenu »Kolubara«. Za oskrbo z vodo je pomembna rečna akumulacija Savsko jezero, za zadrževanje poplavnega vala pa rečna akumulacija pri Avali.

Reliefna razgibanost kot kaže ni v večji meri neposredno zavirala prostorskega razvoja Beograda. Prav na hribovitih območjih južno od mesta je namreč eno od območij najintenzivnejšega širjenja nelegalnih gradenj stanovanjskih objektov. Tudi sicer precejšnji del mesta leži na reliefno razgibanem, v veliki meri puhličnem površju južno od Donave. Vendar pa prav na hribovitih območjih v Šumadiji velika ogroženost s strani zgoraj omenjenih erozijskih pojavov, usadov in zemeljskih plazov kaže na tveganost širjenja mesta na ta območja.

V primerjavo z Ljubljano ima Beograd nekaj pomembnih prednosti z vidika fizičnogeografskih dejavnikov prostorskega razvoja, na primer z vidikov potresne ogroženosti, prevetrenosti in osončenosti. Potresna ogroženost je v Beogradu sicer prisotna, vendar »ugodnejše« prostorsko razmeščena, saj pretežni del samega mesta ni potresno močnejše ogrožen. Najbolj potresno ogrožene so aluvialne ravnice ob Savi in Donavi na Sremski oziroma Banatski strani rek, ter ob Kolubari in nekaterih manjših vodnih tokovih v Šumadiji. Na splošno se potresna ogroženost na širšem območju Beograda povečuje proti jugu in je najvišja okoli Lazarevca. Območje Beograda je v povprečju dobro prevetreno preko celega leta. Posebnost je jesenski in zimski veter košava, ki pomembno prispeva k zmanjševanju problema onesnaženosti zraka v mestu. Visoka letna raven osončenosti in prevetrenosti sta z gospodarskega in okoljskega vidika ovrednoteni kot pomembna energetska razvojna možnost.

Posebnost naravnih danosti Beograda je prisotnost različnih rudnin v bližini mesta, od katerih v največjem obsegu rudarsko in energetsko izkoriščajo lignit v rudarskem bazenu »Kolubara« južno od mesta. Izkoriščanje rudnih bogastev je sicer lahko tudi v prihodnje pomemben dejavnik prostorskega razvoja beograjske regije, vendar bo potrebno posebno pozornost posvetiti zmanjševanju neugodnih vplivov te dejavnosti na razvoj mesta, zlasti z vidika varstva okolja, obremenitev prometnic in nenazadnje videza pokrajine.

25.3. Naselbinski sistem, demogeografske in socialnogeografske značilnosti in procesi

Prebivalstvo mesta (naselja) Ljubljana predstavlja okoli 13 %, prebivalstvo Mestne občine Ljubljana okoli 14 % ter prebivalstvo Ljubljanske urbane regije (ki se prostorsko ujema z Osrednjeslovensko statistično regijo) okoli 25 % celotnega prebivalstva Slovenije. Relativna zastopanost Beograjskega prebivalstva v celotnem prebivalstvu Srbije je dokaj primerljiva z navedenimi vrednostmi za Ljubljano. Na mestnem območju Beograda, ki je sestavljeno iz deset mestnih občin ter predstavlja »naselje Beograd«, prebiva okoli 16 %, na mestnem upravnem območju, ki je sestavljeno iz 17 občin ter predstavlja Beograjsko mestno regijo, pa okoli 21 % celotnega prebivalstva Srbije. Primerjava na podlagi absolutnih vrednosti seveda pokaže izrazito velikostno razliko med mestoma oziroma mestnima regijama. Prebivalstvo mestnega območja Beograda je več kot štirikrat tolikšno, kot prebivalstvo mesta Ljubljana. Število prebivalcev v beograjskem mestnem upravnem območju je skoraj šestkrat tolikšno kot število prebivalcev v Mestni občini Ljubljana ter okoli trikrat tolikšno kot število prebivalcev v Ljubljanski urbani regiji.

Ljubljana sodi med najmanjše državne prestolnice v Evropi, ki zaradi posebnosti slovenskega naselbinskega sistema in vključenosti Slovenije v mednarodne povezave vendarle igra pomembno vlogo »nacionalnega središča mednarodnega pomena«. Po osamosvojitvi Slovenije leta 1991 se je položaj Ljubljane, kljub zmanjševanju števila prebivalcev v samem mestu, v okviru hierarhične mreže slovenskih središč okrepil, povečalo in prebivalstveno se je okrepilo njeno vplivno območje, obenem pa se krepijo tudi nekateri vidiki njenega mednarodnega položaja. Kušar in Pichler-Milanović izpostavljata, da je Ljubljana uvrščena na primer med 76 evropskih metropolitanskih območij rasti (MEGA). V nekaterih scenarijih razvoja mednarodnih povezav pod skupnim imenom »Alpe – Adria – Panonija« pa se Ljubljana pojavlja tudi kot možno središče te morebitne nove EU regije.

Slovenija ima izredno razdrobljen naselbinski sistem, kar nazorno pokaže že samo število naselij (okoli 6000), ki je primerljivo s številom naselij v prebivalstveno in ozemeljsko bistveno večji Srbiji. Strategija policentričnega in regionalno uravnoteženega razvoja, ki jo je Slovenija izvajala od 1970. let naprej, je bila do neke mere uspešna. Med drugim se odraža v zelo nizki stopnji urbaniziranosti (okoli 50 %) ob hkrati eni najvišjih stopenj deagrariziranosti prebivalstva v Evropi. Poseljenost podeželja in zaposlovanje v bližnjih ali manj bližnjih zaposlitvenih središčih ima tudi neugodne učinke, ki se med drugim odražajo v izrazitosti prometnih težav zaradi intenzivnih dnevnih migracij prebivalstva. Ljubljana je kot najmočnejše zaposlitveno, izobraževalno in poslovno središče države deležna tudi največjih tovrstnih težav.

V orisu prebivalstvenih procesov v Ljubljani Rebernik ugotavlja, da je bila za mesto Ljubljana po drugi svetovni vojni značilna stalna počasna rast števila prebivalcev do 1990. let, ko se je število prebivalcev Ljubljane celo nekoliko zmanjšalo, kljub naraščajočim priselitvenim tokovom. Medtem, ko je bila za mestno središče, starejša predmestja in starejše stanovanjske blokove soseske značilna depopulacija, se je v 1980. in 1990. letih prebivalstvo izraziteje gostilo v največjem suburbanem območju v Sloveniji, ki obkroža mesto Ljubljana. V Ljubljanski urbani regiji opazamo procese peri-urbanizacije oziroma eks-urbanizacije, z značilnostmi nenadzorovanega širjenja mesta (urban sprawl) v obliki razpršene poselitve, pogosto izven območij obstoječih podeželskih naselij. Krepitev

priseljavanja v mesto Ljubljana je zlasti po letu 2007 ustavilo upadanje števila prebivalcev, v zadnjem desetletju pa je opazno tudi povečanje selitev prebivalstva znotraj mesta, ki so v primerjavi z večino evropskih mest še vedno razmeroma redke. Slednje so omogočili možnost odkupa najemnih državnih stanovanj v 1990. letih, krepitev stanovanjske gradnje ter posledična oživitev trga nepremičnin. Stanovanjska gradnja pa krepko zaostaja za povpraševanjem po stanovanjih, ki se kljub stagnaciji števila prebivalcev povečuje zaradi spreminjanja velikosti in sestave gospodinjstev (leta 2015 naj bi v Ljubljani primanjkovalo okoli 15.000 stanovanj).

Omenjeni procesi med mestom in njegovo okolico se odražajo v izrazito različni starostni sestavi prebivalstva, kar je tudi sicer splošna značilnost urbanih regij v Evropi: na okoliških suburbanih območjih je prebivalstvo razmeroma »mlado«, v mestu pa v povprečju zelo staro (indeks staranja za Mestno občino Ljubljana znaša okoli 135, za celotno urbano regijo pa okoli 70). Z vidika prostorskega načrtovanja se na primer pojavljajo problemi neustrezne prostorske razmestitve javnih storitev in delovnih mest glede na zastopanost določenih starostnih skupin prebivalstva. V številnih občinah na obrobju regije primanjkuje mest v otroških vrtcih in osnovnih šolah, medtem ko jih je ponekod v Ljubljani več, kot je povpraševanja. Pojavljajo se problemi pomanjkanja razpoložljivih mest v domovih za ostarele in alternativnih oblik storitev za ostarelo prebivalstvo, kot so na primer oskrbovana stanovanja ter skrb za ostarele na domu.

V orisu ljubljanskega »dnevnega mestnega sistema« Pichler-Milanović in Krevs poudarjata, da selitve delovno aktivnega prebivalstva na obrobje regije izdatno prispevajo k povečevanju dnevnih selitev med obrobjem mestne regije in Ljubljano. Dnevni (lokalni) mestni sistem Ljubljane, ki se po merilih uporabljenih v novejših raziskavah približno ujema z Ljubljansko urbano regijo, prispeva okoli 150.000 dnevnih migrantov na delo in izobraževanje v Mestno občino Ljubljana. Količina dnevnih delovnih migrantov v MOL se je v obdobju 2000-2007 povečala za več kot 40 %.

V poglavju o socialno-geografskih značilnostih Ljubljane Rebernik in Krevs ugotavljata, da kljub razmeroma majhnim družbenim razlikam v Sloveniji v primerjavi z drugimi evropskimi državami urbano-geografske raziskave kažejo, da v Ljubljani obstajajo socialno-ekonomske razlike med mestnimi območji in se v zadnjih dveh desetletjih povečujejo. Na splošno je stopnja socialno-ekonomske segregacije med območji v Ljubljani zmerna, vendar obstajajo tudi razmeroma homogena socialno-ekonomska območja. Med takšna na primer sodijo socialno deprivirana območja, kot sta Rakova jelša in Sibirija, za katera so značilni zgostitev prebivalstva z zelo nizkim socialno-ekonomskim statusom, visok delež »Neslovenskega« prebivalstva in pogosto pojavljanje nelegalne gradnje v preteklosti. Območja prebivalstva z visokim socialno-ekonomskim statusom se na primer nahajajo v »tradicionalno elitnih« predelih mesta z vilami, tudi na nekaterih območjih starejših ali novejših večstanovanjskih, enodružinskih ali vrstnih hiš v različnih delih mesta, tudi v obmestjih, ter na manjših območjih gentrifikacije v starejšem mestnem jedru.

Raziskave medobmočnih razlik z vidika kakovosti življenja ter dojemanja območij znotraj Mestne občine Ljubljana podpirajo in dopolnjujejo spoznanja »tradicionalnih« urbano-geografskih raziskav. Med potencialno obetavne izzive za usmerjevalce prostorskega razvoja, med njimi tako mestne politike, kot različne informacijske medije, pa lahko uvrstimo ne le neposredno poseganje v prostor, ampak tudi izpodrivanje negativnih stereotipov o nekaterih območjih s pozitivnimi, tudi bolj verodostojnimi predstavami o teh soseskah.

Z utrjevanjem pozitivne lokalne identitete je mogoče izboljšati možnosti lokalnega povezovanja in sodelovanja pri reševanju lokalnih problemov, zmanjševati napetosti med stanovalci različnih socialno-ekonomskih ali etničnih skupin prebivalstva, nenazadnje pa lahko vplivamo tudi na privlačnost sosesk za bivanje ter posledičen dvig vrednosti nepremičnin.

Delež mestnega prebivalstva v Srbiji znaša 56 %, kar je nekoliko več, kot v Sloveniji, a tudi Srbijo uvršča med evropske države z nizko stopnjo urbanizacije. Delež srbskega mestnega prebivalstva, ki živi v Beogradu, je primerljiv z deležem slovenskega mestnega prebivalstva, ki živi v Ljubljani (v obeh primerih nekaj več kot četrtnina). Vendar je Beograd z vidika števila prebivalcev skoraj šestkrat tolikšen kot drugo največje mesto, medtem ko je Ljubljana manj kot trikrat tolikšna kot Maribor. Avtorja poglavja o omrežju mestnih naselij v Srbiji (D. Tošić, Nevenić) ocenjujeta, da pozivi prostorskih načrtovalcev k policentričnemu razvoju naselbinskega sistema niso bili uspešni. Izredno visoka stopnja centralizacije se kaže predvsem v pomanjkljivi razvitosti srednje velikih (makro-)regionalnih središč, ki bi jih bilo potrebno okrepiti ne le zaradi izboljšanja nacionalnega naselbinskega omrežja, temveč tudi za uspešnejše prevzemanje vloge v mednarodnem evropskem medregionalnem povezovanju. Avtorja opozarjata tudi na nujnost preobrazbe policentričnega metropolitanskega območja Beograda, za katerega je značilno močno glavno središče in šibka suburbana središča, v sodobno policentrično območje, v katerem bodo okrepljena suburbana središča prevzela več funkcij glavnega središča. Posebnost srbskega naselbinskega omrežja je izpostavljanje povezovanja s srbskimi območji izven Srbije, na primer s središči v Republiki Srbski v Bosni in Hercegovini.

Glavne značilnosti demografskega razvoja mesta Beograda, ki ga v knjigi obravnavata Vojković in Devedžić, so upočasnitev skupne rasti števila prebivalstva v 1980. in 1990. letih, depopulacija mestnega jedra in prebivalstvena krepitev suburbanih območij. Selitvene procese so v 1990. letih dopolnili vojni begunci, ki so se priseljevali v mesto ter številni dotedanji prebivalci, ki so mesto (in državo) zapustili. V obdobju po letu 2000 je bil pretežni del priselitev usmerjen v suburbana območja, medtem ko je bil naravni prirastek v vseh mestnih in suburbanih občinah negativen (v celotnem mestu Beograd -3,3 % leta 2000). Slednje je zlasti zaskrbljujoče, ker je Beograd največja zgostitev prebivalstva v državi in ima relativno ugodnejšo starostno sestavo od ostale Srbije. Posebnost demografskih procesov v Beogradu je bilo izrazito pomanjkanje ženskega prebivalstva v celotnem 19. in v prvi polovici 20. stoletja. V drugi polovici 20. stoletja beležijo stalno naraščanje in sedanjo prevlado deleža ženskega prebivalstva. Kljub velikim priselitvam v mesto sta zniževanje rodnosti ter povečevanje pričakovane dolžine življenja povzročila neprekinjen proces staranja prebivalstva (indeks staranja 103). Proces danes zajema vse dele mesta, najmočnejši pa je v mestnem jedru.

Stamenković in Gatarić analizirata obseg dnevnih migracij in njihov učinek na »dnevni mestni sistem« Beograda. Zaradi različne upravne delitve ozemlja ter tudi različnega prostorskega in prebivalstvenega obsega Ljubljane in Beograda težko neposredno primerjamo tovrstne ugotovitve za obe mesti. Vendarle ugotavljamo, da se dnevna mestna sistema precej razlikujeta. V Beogradu so dnevne delovne in izobraževalne selitve znotraj ozemlja samega mesta že zaradi razdalj relativno večje, kot v Ljubljani. Absolutna količina dnevnih migrantov med suburbanim zaledjem in mestom pa je v Ljubljani celo nekoliko večja, kot v Beogradu, kar nakazuje izrazito zgoščanje dnevnih migrantov na ozemlju Ljubljane.

V analizi socialno-geografskih značilnosti Beograda Ratkaj in Grcić predstavita faktorsko-ekološko preučitev in členitev mestnega ozemlja. Posebnost njunega pristopa je, da poleg »socialnih kazalcev« uporabita tudi »kazalce fizičnega prostora«. S členitvijo na »socialna območja« sta opredelila območja skrajno mestnega socialnega statusa, območja prehodnega socialnega statusa z visokim stanovanjskim standardom, območja socialnega statusa suburbanih migrantov, območja podeželskega socialnega statusa ter območja stanovanjske segregacije. V členitvi na podlagi »kazalcev fizičnega prostora« opredelita: staro mestno jedro (ki zavzema manj kot 5 % površine, okoli 25 % prebivalstva ter 41 % delovnih mest v mestu Beogradu), suburbana stanovanjska območja, suburbana podeželska območja, poslovna središča in območja podstandardnih stanovanjskih razmer.

Socialnogeografske in etnično-geografske segregacije ter ponekod njunega povečevanja avtorji (Rebernik, Krevs oziroma Ratkaj, Grcić) ne izpostavljajo kot pomembnejšega izziva za (prostorske) načrtovalce v Ljubljani in Beogradu. To dejstvo najverjetneje odraža razmeroma nizke stopnje segregacije v primerjavi s številnimi mesti v Evropi, ki jih vsaj do neke mere lahko pripišemo učinkom socialistične družbene ureditve do 1990. let. Z vidika etnične segregacije so najverjetneje še pomembnejši razlog bistveno manjše kulturne razlike med priseljenimi, ki v primeru obeh mest izvirajo skoraj izključno z ozemlja nekdanje skupne države Jugoslavije, in večinskim prebivalstvom, v primerjavi s tovrstnimi razlikami in problemi v večini zahodnoevropskih prestolnic.

25.4. Ekonomskogeografske, prostorsko-funkcijske in prometne spremembe

Obe obravnavani mesti sta v svojem nacionalnem okviru daleč najmočnejši gospodarski središči. Kljub velikostni razliki med mestoma ter različnih razvojnih kontekstih v zadnjih dveh desetletjih Ljubljana in Beograd doživljata nekatere podobne procese prostorskega razvoja gospodarstva.

Gospodarski položaj Ljubljane v okviru slovenskega gospodarstva lahko na primer predstavimo z zgostitvami zaposlitve več kot petine delovno aktivnega prebivalstva, tretjine celotnega prihodka in bruto dodane vrednosti ter več kot 40 % celotnega dobička v Sloveniji (Bole, 2008). Zanimivo je, da Ljubljana k izvozu države prispeva manj od 15 %, k uvozu pa več kot 36 %. Sodi med izrazito kvartarno in zmerno terciarno dejavnostno usmerjena slovenska mesta (ibid.). Po ocenah (Ljubljana..., 2010; GDP..., 2009) znaša bruto domači proizvod na prebivalca v paritetah kupne moči (GDP PKM) za Slovenijo 88 %, za Ljubljansko urbano regijo 125 % ter za Mestno občino Ljubljana med 140 in 175 % povprečja Evropske unije (EU 27). V letu 2008 to pomeni 20680 € za Slovenijo, 29375 € za Ljubljansko urbano regijo ter 32900 – 41125 € na prebivalca (GDP PKM) za Mestno občino Ljubljana. Od več kot 190.000 delovnih mest (Statistični letopis Ljubljane, 2008) jih je med dejavnostmi največ v trgovini, javni upravi, obrambi in obveznem zdravstvenem zavarovanju, gradbeništvu, šolstvu in zdravstvu. Med vsemi dejavnostmi največje površine zasedajo poslovne dejavnosti in storitve, servisi in trgovina. Ocena, da je neizkoriščenih okoli 27% površin (Bole, 2008) kaže, da obstajajo precejšnje prostorske možnosti za umeščanje dejavnosti.

Med gospodarsko-prostorskimi procesi je na splošno opazna dekoncentracija gospodarskih dejavnosti, ki se selijo iz gosto poseljenih mestnih območij na suburbana območja, kjer je boljša prometna dostopnost, nižje cene zemljišč in boljša prilagodljivost lokacij (Ravbar, 2002). Med takšnimi dejavnostmi je v velikem obsegu tudi trgovina, kar povzroča zamiranje trgovine v mestnem središču na račun predmestnih nakupovalnih središč (Rebernik, 2007).

V poglavju o prostorsko-funkcijskih spremembah metropolitanskega območja Ljubljane Rebernik opaža tudi intenziven »notranji razvoj« ter sanacijo in ponovno rabo nekaterih degradiranih mestnih območij. Po letu 1995 so zasebni investitorji postali pomembni dejavniki spreminjanja mesta in njegovih grajenih struktur. Po eni strani se je nadaljevala načrtovana in nenačrtovana širitev pozidanih površin na suburbanih in podeželskih območjih v urbani regiji. Po drugi strani se je okrepil tudi »notranji razvoj« mesta, z gradnjami znotraj gosto pozidanih mestnih območij, na mestnih degradiranih površinah ter na mestnem obrobju. »Notranji razvoj« je v celoti prepuščen zasebni pobudi, kar pogosto prinaša tudi neustrezne in s prostorskim planom slabo usklajene posege v prostor. Stanovanjske pozidave degradiranih mestnih površin so največkrat izvedene v obliki posameznih zgradb, večinoma »vilskih stanovanjskih blokov«. Na degradiranih območjih se pojavljajo tudi nove nakupovalne površine, manj pogosto pa nameščanje drugih gospodarskih dejavnosti. Zlasti znotraj mesta so značilni pretirani izkoristki z zgradbami zasedenih površin, kar sicer prinaša investitorjem večje dobičke, uporabnikom prostora pa znižuje kakovost bivalnega okolja.

Tudi območja razpršene poselitve na obrobju mesta in širše na suburbanih in podeželskih območjih v urbani regiji lahko pogosto obravnavamo kot degradirana stanovanjska območja. Prevladujoče skupne značilnosti teh območij so namreč, da so slabo ali sploh niso načrtovana, brez enotne urbanistične ali morfološke zasnove, skromno opremljena s komunalno in drugo infrastrukturo, za starejša tovrstna območja pa je značilen tudi razmeroma nizek socialnoekonomski status prebivalstva.

Tradicionalni način opredeljevanja namenske (planske) rabe prostora s pomočjo neprilagodljivega coniranja se je izkazal kot problematičen, saj načrtovalci težko predvidijo potrebe in interese investitorjev. Tako se pojavljajo območja, predvidena za gradnjo, za katera ni zanimanja investitorjev, drugod pa slednji s pritiski na občine dosegajo spremembe obstoječe planske rabe zemljišč. Takšne razmere bodisi »odganjajo« investitorje, ali pa povzročajo neustrezne posege v prostor. Nov pristop k reševanju tega problema, uporaba kategorije »mešana raba« zemljišč, naj bi omogočil večjo prilagodljivost pri posegih v prostor. Rebernik se sprašuje, če je to prava pot k reševanju problema. Ne prav redki primeri novejših stanovanjskih zgradb z nezasedenimi poslovnimi prostori v pritličju namreč kažejo, da mešana raba morda ni vedno pot k smotnejši rabi prostora.

Prometno problematiko Ljubljane v knjigi M. Ogrin obravnava predvsem z vidika dnevnih migracij prebivalstva, saj ta tudi največ pripeva k obremenitvam prometnega omrežja ter okoljskim učinkom prometa znotraj mesta in v širši urbani regiji. Slovenske ceste sodijo med manj obremenjene evropske cestne povezave. Kljub temu lahko v prihodnje pričakujemo, da bo imel rastoči tovarni in turistični, v veliki meri tranzitni promet večji vpliv tudi na prometne in okoljske probleme v Ljubljani in njeni mestni regiji.

Pospešeni proces motorizacije je v Ljubljani povzročil veliko prevlado osebnega avtomobilskega nad ostalimi oblikami prometa tako znotraj mesta (65 % vseh potovanj) kot v urbani regiji (90 % vseh potovanj). Avtobusni javni potniški promet ima le manjšo vlogo v znotraj-mestnem in še manjšo v medmestnem prometu med Ljubljano, njenimi obmestji in širšo Ljubljansko urbano regijo. Njegova glavna pomanjkljivost je po mnenju Mateja Ogrina izredna počasnost potovanja in cenovna nekonkurenčnost v primerjavi z osebnim avtomobilom. Starega železniškega omrežja doslej ni uspelo pomembneje vključiti med prometna sredstva dnevnega migriranja med Ljubljano in širšo urbano regijo. Da bi dosegli boljšo znotraj-mestno mobilnost vse številnejši prebivalci za potovanje na primer na delo in v šolo uporabljajo kolo. Matej Ogrin v knjigi ocenjuje, da se kolesarska infrastruktura razvija prepočasi, da bi lahko zadovoljila potrebe hitro rastočega kolesarskega prometa.

Z naraščanjem števila prebivalstva, ki se iz širše regije vozijo dnevno na delo in v šole v Ljubljani, lahko pričakujemo, da bo javni cestni potniški promet še naprej izgubljal svoj pomen, če ne bo celovito izpopolnjen. Obstoječi trendi nakazujejo povečevanje prometnih gneč in prevlade osebnih avtomobilov. Takšni trendi vodijo tudi k vse večjim obremenitvam okolja, od neustrezne rabe tal do povečanja hrupa, onesnaževanja zraka in porabe energije.

Med razvojnimi izzivi javnega potniškega prometa lahko izpostavimo ustrezno vključitev železniškega potniškega prometa v sistem javnega prevoza v mestni regiji in tudi znotraj mesta, boljše možnosti za kombiniranje različnih načinov potovanja (na primer možnost prevoza koles z vlakom ali avtobusom) ter izboljšanje kolesarske infrastrukture v Ljubljani in v njeni urbani regiji. V zvezi s slednjim je bila na podlagi vse glasnejših in bolj organiziranih pritiskov prebivalcev Ljubljane leta 2010 sprejeta »strategija kolesarskega razvoja«.

Gospodarski položaj Beograda kaže v okviru srbskega gospodarstva nekoliko višjo stopnjo centralizacije, kot položaj Ljubljane v Sloveniji. V Beogradu je zgoščenih okoli 30 % delovnih mest od vseh delovnih mest v Srbiji, 35 % bruto domačega proizvoda, 40 % visoko izobraženega prebivalstva ter prav toliko zaposlenih v storitvenih dejavnostih. Podobno, kot v Ljubljani, prevladujejo terciarne in kvartarne dejavnosti, obenem pa Miletićeva opaza modernizacijo sekundarnih dejavnosti, zlasti na obrobni mestnih območjih. Posebnost Beograda je velik pomen rudarstva, zlasti pridobivanja lignita, ter dejstvo, da je eno redkih velikih mest, ki s primarno kmetijsko proizvodnjo in predelavo hrane zmorejo zadovoljiti potrebe lastnega prebivalstva. Bruto domači proizvod na prebivalca je leta 2005 znašal 2800 evrov. Po veliki krizi v 1990. letih kljub stalnemu naraščanju šele v zadnjih letih presega raven iz leta 1989, ko je znašal okoli 4000 evrov.

V poglavju o ekonomskogeografskih vidikih prostorskega razvoja Beograda Miletićeva izpostavlja proces dekoncentracije, lahko bi ga poimenovali tudi proces »notranjega mestnega policentrizma«, ki se odraža na različne načine. Tradicionalni mestni središči Beograda in Zemuna postopno postajata vse manj gospodarsko pomembni, zlasti na področju trgovine. Med območji izrazitejšega zgoščanja poslovnih in finančnih funkcij avtorji v knjigi izpostavljajo Novi Beograd, celo kot možno novo poslovno-finančno središče mesta. Razvojna prednost Novega Beograda pred sedanjim mestnim jedrom je predvsem v obsežnih prostih površinah (za t.i. greenfield naložbe), dobra urbanistična zasnova ter obstoječa infrastruktura. Proizvodne dejavnosti se bolj zgoščajo na perifernih in robnih območjih strnjenegega mesta, v bližini pomembnejših cest. Med razvojnimi prednostmi mesta Miletićeva in tudi Prostorski plan Republike Srbije izpostavljajo »Svo-

bodno cono Beograd«, kjer se na okoli 8 hektarih zgoščajo številne dejavnosti – od predelovalnih, do trgovskih. Prepoznava predvsem dva tipa razvojnih gospodarskih jeder: »dinamična« v obliki nakupovalnih središč, letaliških con, tehnoloških parkov, poslovno-komercialnih con, ki se večinoma pojavljajo na mestni periferiji ter »stagnirajoča« v obliki tradicionalnih industrijskih con, vojaških objektov in podobnih brownfield razvojnimi oblikami. Med izzivi prostorskega razvoja avtorji v knjigi izpostavljajo tudi boljše izkoriščanje ugodnega prometnega položaja, možnosti razvoja turizma, zmanjševanje gospodarske nekonkurenčnosti in soočanje z zgostitvami okoljsko tveganih oziroma obremenjujočih dejavnosti znotraj mesta.

V poglavju o prostorsko-funkcijskih spremembah metropolitanskega območja Beograda B. Tošić in Živanović ugotavljata, da razlike med »prostorskimi enotami« znotraj Beograjskega upravnega območja posredno kažejo tudi nekatere poteze funkcijske zgradbe mesta in procesov njenega spreminjanja. Za naselje Beograd (sestavljeno iz 10 mestnih občin) je značilna stagnacija števila prebivalstva z dolgotrajno depopulacijo v samem jedru mesta, stabilno in razvito funkcijsko sestavo s prevlado storitvenega sektorja v gospodarski usmerjenosti, okoli 85000 dnevnimi imigranti in najvišjimi dohodki prebivalstva. Drugo enoto predstavljajo naselja v suburbanem območju Beograda, za katera je sicer značilen dolgotrajen razvojni vpliv mesta in zmeren stopnja deagrarizacije. Med tamkajšnjimi območji prevladujejo stanovanjska predmestja, naselja »vikendov« in stanovanjsko-industrijska naselja. Tretjo enoto predstavlja sedem suburbanih občin, ki so se tudi razvijale pod močnim vplivom Beograda, kar se odraža v velikem deležu (nad 60 %) neagrarnih naselij in velikem številu dnevnih migrantov proti mestu. Za del teh območij je značilna večja zastopanost primarnih gospodarskih funkcij ter predelava kmetijskih pridelkov. Za velik del širšega obrobja Beograda je značilna ilegalna razpršena stanovanjska in »vikendaška« gradnja, tako na ravninskih kot na reliefno razgibanih območjih. Posebnost poselitve je »sklenjena razpršena« gradnja, ki zapolnjuje tudi območja med naselji.

Lukić in Šećerov ugotavljata, da promet sodi med velike razvojne probleme, a tudi potencialne Beograda. V zadnjih dveh desetletjih se je mednarodna prometna vloga mesta drastično skrčila, zato so bile v tem času v ospredju predvsem prometne problematike navezane na vlogo mesta v državi in mestni funkcijski regiji. S ponovnim gospodarskim in političnim povezovanjem Srbije s sosednjimi in drugimi evropskimi državami so v razvojnih načrtih mesta spet oživiljeni tudi izzivi mednarodnega prometnega povezovanja. Ti izzivi vključujejo na primer reševanje problematike izgradnje avtocestnega omrežja z ustrežno tehnično-informacijsko opremljenostjo ter storitvenimi dejavnostmi, posodobitev in razširitev železniškega omrežja, posodobitev in povečanje letaliških zmogljivosti za prevoz blaga, posodobitev rečnih pristanišč in njihovo medsebojno usklajeno delovanje ter razvoj ustrezne mreže sodobno opremljenih logističnih središč. Na regionalni in lokalni ravni so med najbolj izpostavljenimi prometnimi problemi slabo stanje cestnega in železniškega omrežja in samih prometnic, nezadosten železniški vozni park ter izkoriščenost rečnega prometa izključno za prevoz blaga. Z vidika prostorskega razvoja mesta in mestne regije so med najbolj izpostavljeni naslednji razvojni problemi: pretirana enosrediščna zgostitev delovnih mest v mestnem jedru, delno mešanje lokalnega in tranzitnega prometa, pomanjkanje visoko zmogljivih oblik prometa v najbolj obremenjenih prometnih koridorjih, izredno veliko pomanjkanje parkirnih mest, nerešen problem beograjskega železniškega vozlišča, zanemarjen in marginaliziran rečni promet, izrazito zmanjšanje vloge Beograda v letalskem prometu v tem delu Evrope ter navsezadnje odsotnost dolgoročne prometne

politike. Prioritete pri reševanju številnih navedenih težav mesto daje izgradnji mostov, avtocestne mestne obvoznice in drugih mestnih cestnih obvoznic, ob posodabljanju obstoječih prometnih sistemov.

25.5. Onesnaževanje in varstvo okolja

Različni vidiki onesnaženja okolja so hkrati posledice (do)sedanjega ter dejavniki bodočega prostorskega razvoja Ljubljane. Varovanje okolja žal ni samoumevno in je pogosto žrtev prevlade ozkoglednega in kratkoročnega sledenja zasebnim in gospodarskim ciljem nad dolgoročnejšim, okoljsko odgovornim ravnanjem. Vendarle Plut in Špes v poglavju o onesnaževanju in varstvu okolja ugotavljata, da v načrtovanju trajnostnega razvoja Ljubljane postaja okoljski vidik vse bolj enakovreden ekonomskemu in socialnemu.

Med najpomembnejšimi okoljskimi problemi prostorskega razvoja Ljubljane in Mestne občine Ljubljana avtorja izpostavljata povečevanje prometnega onesnaževanja zraka in hrupa vzdolž najbolj obremenjenih prometnic, močno onesnaženje površinskih voda v mestu ter občasno previsoko vsebnost zdravju škodljivih strupenih snovi v podtalnici na Ljubljanskem polju, povečevanje okoljskih pritiskov na hidrogeografsko zaledje črpališč pitne vode na Ljubljanskem polju, težave z odlaganjem in reciklažo velikih količin odpadkov, številna ilegalna odlagališča odpadkov, velik ekološki odtis na prebivalca ter prekomerne izpuste toplogrednih plinov.

V obdobju 1998 – 2007 avtorja poročata o izboljšanju z vidika treh oblik okoljskega onesnaženja: zmanjšanju onesnaženja zraka z žveplovim dioksidom, obratovanja čistilne naprave za čiščenje odpadnih voda ter delno očiščenje in reorganizacijo odlagališča odpadkov na Barju. V tem obdobju pa so se na primer poslabšale okoljske razmere z vidika onesnaženja z dušikovimi oksidi in nelegalnih odlagališč odpadkov.

Za doseganje trajnostnih načel v bodočem prostorskem razvoju Ljubljane bo po mnenju avtorjev potrebno v ospredje prostorskega načrtovanja in delovanja postaviti ohranitev okoljsko primerne zvezdasto oblikovane mestne zasnove; uravnoteženje zgostitve pozidave in drugih okoljskih pritiskov z zgoščanjem gradenj vzdolž prog javnega prometa; ohranjanje in povečanje samočistilnih zmogljivosti, pokrajinske in biotske raznovrstnosti mestnih in podeželskih ekosistemov v Mestni občini Ljubljana; postopno zmanjšanje rabe naravnih virov in različnih emisij ter ustrežnejšo prostorsko organizacijo stanovanjskih, zaposlitvenih in priložnostnih dejavnosti.

Okoljski problemi prostorskega razvoja Ljubljane in Beograda se razlikujejo že zaradi različnih fizičnogeografskih razmer, izrazite velikostne razlike med zgostitvama prebivalstva, gospodarskih in negospodarskih dejavnosti ter različnih dosedanjih pristopov k soočanju s tozadevno problematiko. V zvezi s slednjim Filipović in Obradović-Arsić v poglavju o okoljskih vidikih načrtovanja in razvoja Beograda navajata številne pomanjkljivosti, ki jih lahko razumemo kot doslej zamujene priložnosti in obenem kot izzive za obravnavo okoljske problematike v bodoče. Ni sistematičnega nadzora nad katerikoli vidikom onesnaževanja okolja, niti nad nevarnimi odpadki, ki jih ponekod že desetletja shranjujejo v neustreznih »začasnih« skladiščih. Splošna raven komunalne čistoče je nizka, kemična sredstva se v kmetijstvu uporabljajo brez nadzora, ni čistilnih naprav za čiščenje odpadnih voda in emisij v zrak, vlada nered na področju organiziranega odlaganja odpad-

kov. Zlasti v središču mesta so izredno problematični onesnažen zrak, hrup ter nameščanje nekaterih proizvodnih dejavnosti in dejavnosti, ki uporabljajo nevarne snovi. Na območjih kmetovanja izstopata prekomerna onesnaževanje prsti in nelegalna pozidava kmetijskih površin. Poleg teh avtorja izpostavljata še problematiko neposrednega izlivanja kanalizacije v reke, neracionalne rabe naravnih virov in energije ter pomanjkanja gozdnih površin. Avtorja izpostavljata strateške usmeritve razvoja proizvodnih dejavnosti, kmetijstva, turizma, prometne in komunalne infrastrukture, zaščite vodnih virov in gozdarstva, ki naj bi prispevale k reševanju navedenih nakopičenih okoljskih problemov.

Da se mestna uprava zaveda pomena reševanja okoljskih problemov, nakazuje izražen namen, da se Beograd pridruži zvezi »zdravih mest«. Prepoznavanje pomembnosti in daljnosežnosti reševanja te problematike v Beogradu in Ljubljani je pomemben korak. Samo reševanje pa zaradi počasnosti spreminjanja potekajočih naravnih in družbenih procesov, v veliki meri pa tudi vztrajnosti obstoječih navad glede okoljskega ravnanja na vseh ravneh, od mestnih uprav, podjetij, do posameznikov, žal ne bo prav hitro.

25.6. Strateško usmerjanje prostorskega razvoja

Na poenostavljen način lahko strateško usmerjanje prostorskega razvoja razumemo kot delovanje, ki teži k doseganju dolgoročnejših, trajnejših, za velik del prebivalstva pomembnih ciljev v prostorskem razvoju. V obeh obravnavanih mestih je bilo tako razumljeno strateško načrtovanje po drugi svetovni vojni, do 1990. let, pomemben, na marsikaterem področju tudi prevladujoč način načrtovanja prostorskega razvoja, čeprav je dejanski prostorski razvoj pogosto odstopal od načrtovanega. Dolgoročno načrtovanje, oziroma kar načrtovanje nasploh, je v 1990. letih dobilo prizvok dotedanje socialistične družbene ureditve. V zadnjem desetletju 20. stoletja se je v obeh mestih in njunih mestnih regijah zgodil velik preobrat v dejavnih prostorskega razvoja. Vse večjo, ponekod tudi prevladujočo vlogo je pri posegih v prostor prevzel zasebni kapital oziroma »tržne sile«, kar je pogosto pripeljalo do večjih odstopanj od dolgoročnih načrtov prostorskega razvoja in tudi od načel sodobnega urejanja in oblikovanja mest in še bolj okoliškega podeželja, bistveno večjih, kot v preteklosti.

V Ljubljani je po mnenju Pichler-Milanovičeve povod za ponovno vrnitev strateškega načrtovanja proti koncu 1990. let njeno postopno oblikovanje kot prestolnice novonastale države ter njena internacionalizacija. Z vidika dolgoročnejšega razvoja mesta in njegovega vplivnega območja je izrednega pomena načrtovanje in usklajevanje (prostorskega) razvoja v širši mestni regiji, k čemur pripomore leta 2002 ustanovljena Regionalna razvojna agencija Ljubljanske urbane regije. Med najpomembnejšimi strateškimi dokumenti, ki so vplivali ali še vplivajo na prostorski razvoj Ljubljane, so na primer:

- na državni ravni: Strategija gospodarskega razvoja: približevanje Evropi – rast, konkurenčnost in integriranje (1995), različni sektorski razvojni programi (v obdobju 1995–2000), Zakon o urejanju prostora (2002), Zakon o graditvi objektov (2002), Strategija prostorskega razvoja Republike Slovenije s Prostorskim redom (2004), Nacionalna strategija razvoja Republike Slovenije (2005), Zakon o prostorskem načrtovanju (2007) in poseben akt o prestolnici Zakon o glavnem mestu Republike Slovenije (2004);

- na regionalni ravni: Regionalni razvojni program Ljubljanske urbane regije 2002-2006 in 2007-2013;
- na občinski oziroma mestni ravni: Vizija mesta Ljubljana 2025 (2007), Strategija prostorskega razvoja Mestne občine Ljubljana in Izvedbeni del prostorskega načrta Mestne občine Ljubljana (2010).

Hitrost in obseg razvojnih procesov po drugi svetovni vojni sta po mnenju D. Djordjevića in Dabovičeve v Beogradu še bolj, kot v drugih republiških središčih Jugoslavije, terjala strateško načrtovanje razvoja. Kljub nekaterim še vedno neuresničenim načrtom iz Generalnega plana Beograda iz leta 1950 je strateško načrtovanje vendarle uspevalo vsaj do neke mere usmerjati prostorski razvoj mesta do 1990. let. V obdobju med Generalnim planoma v letih 1985 in 2003 je stopilo strateško načrtovanje v senco drugih dejavnikov prostorskega razvoja. Poleg sorodnih, kot v Ljubljani, na primer zasebnih investicij, sprememb v delovanju trga nepremičnin, denacionalizacije nepremičnin, je v Beogradu desetletna globoka mnogorazsežnostna kriza pripeljala do »kolektivne krize identitete in erozije zaupanja v ustanove«. V prostorskem razvoju se je to med drugim odražalo v nelegalni gradnji v širši mestni regiji in tudi v mestnem središču, med primeri skrajnejših, sicer na videz legaliziranih, posegov v prostor pa avtorja omenjata t.i. »kiosk urbanizacijo«. Poleg omenjenega Generalnega plana Beograda do leta 2021 (iz leta 2003) sta v procesu nastajanja še dva pomembna strateška načrtovalska dokumenta. Osnutek Razvojne strategije mesta Beograda je nastal leta 2008, strategija pa naj bi začela veljati leta 2012. Regionalni prostorski plan Administrativnega območja Beograda (2004) predstavlja strateško podlago za urejanje prostorskega razvoja v širši mestni regiji Beograda. Avtorja sta zaskrbljena, da bodo nakopičeni problemi strateškega načrtovanja in prostorskega razvoja, dodatno obteženi s svetovno gospodarsko krizo, vplivali na odlaganje uresničevanja strateških razvojnih ciljev, zlasti tistih bolj optimistično navezanih na proces vključevanja Srbije v Evropsko Unijo, v nedoločeno prihodnje obdobje.

25.7. Informacijske in komunikacijske tehnologije, geoinformatika, prostorsko načrtovanje in razvoj

Geoinformatika je na različne načine vključena v pripravo strateških in izvedbenih prostorskih načrtov v obeh mestih oziroma njunih mestnih regijah. Uporaba geoinformacijskih postopkov, standardov in orodij lahko pomembno prispeva k časovni, tudi ekonomski učinkovitosti izvajanja posameznih prostorsko raziskovalskih in prostorsko načrtovalskih opravil ter h kakovosti informacij, ki jih uporabimo v ta namen. Izrazito je napredovala uporaba geoinformatike, v povezavi s sodobnimi informacijskimi in komunikacijskimi tehnologijami, pri posredovanju geografskih (kartografskih) informacij o prostorskem planu in o stanju v prostoru javnosti. Težko pa bi ocenili, da geoinformatika pomembno vpliva na kakovost celotnega prostorskega načrtovanja in prostorskega razvoja v obravnavanih mestih. Razen nekaj izjem namreč postopki na področju urejanja prostora potekajo še na zelo tradicionalen način; možnosti, ki jih za posodobitev tovrstnih postopkov v smeri e-uprave in e-demokracije ponuja geoinformacijska tehnologija, so izkoriščene še v zelo majhni meri.

Med možnostmi za izpopolnitev rabe geoinformatike v občini Ljubljana Krevs izpostavlja izboljšave kakovosti nekaterih obstoječih ter vzpostavitev nekaterih novih geoinformacijskih slojev ter zakonsko ureditev uporabe geografskih podatkov, ki jih zbira Agencija RS za okolje. Kljub kakovostni »zunanji« geoinformacijski podpori, ki jo Mestni občini Ljubljana nudijo na primer Ljubljanski urbanistični zavod, posredno pa tudi številne raziskovalne ustanove, avtor meni, da bi bilo nujno okrepiti (geo)informacijski oddelke na MOL. To naj bi povečalo možnosti za inovativno rabo geoinformatike v približevanju prostorskemu načrtovanju in prostorskemu razvoju z večjo in bolj vsestransko udeležbo javnosti. Prav napredek v smeri e-uprave in e-demokracije, in ne zgolj tehnična opremljenost in kakovost podatkov, naj bi po mnenju avtorja predstavljal glavno obetajoče področje za prispevek geoinformatike k smotrnejšemu prostorskemu razvoju. Z javnim spletnim dostopom do prostorskega načrta Mestne občine Ljubljana je bil storjen pomemben korak v smeri informiranja javnosti. S spletno aplikacijo, ki je omogočala odzivanje prebivalcev na predlagani prostorski načrt in vključuje tudi preko spleta dostopne odgovore MOL na te odzive, pa je občina naredila naslednji korak k vključevanju javnosti v prostorsko načrtovanje in prostorski razvoj. Na podlagi uporabljenega »modela« za ocenjevanje dosežene stopnje razvoja prostorskega načrtovanja je Mestna občina Ljubljana še vedno daleč od demokratičnega prostorskega načrtovanja, ki bi vsebovalo dejansko in večstransko dejavno vključevanje javnosti. Vendar upamo, da omenjena primera dobre prakse nakazujeta zavedanje občine, da je razvoj v to smer pomemben in smiseln. Geoinformacijske in informacijsko-komunikacijske tehnologije, ki lahko podpirajo razvoj v to smer, predstavljajo bistveno manjši problem, kot odločitve in delovanje občine, da jih uporabi za doseganje tega možnega razvojnega cilja.

Med težavami, s katerimi se srečujejo na področju rabe geoinformatike za potrebe prostorskega načrtovanja in urejanja prostora v Srbiji in v Beogradu A. Djordjević izpostavlja razdrobljenost, neusklajenost, tudi podvojenost prostorskih podatkov in geoinformacijskih aplikacij. Med temeljnimi ustanovami, ki skrbijo za razvoj in delovanje geoinformatike v Beogradu sta Direkcija za gradbena zemljišča in gradnjo Beograda ter Inštitut za informatiko in statistiko pri mestni upravi Beograda. Direkcija med drugim skrbi za dostopnost in ažurnost interaktivne karte Beograda ter podrobnih prostorskih ureditvenih načrtov od leta 2003 naprej. Omenjeni inštitut pa je nosilec razvoja uporabe geoinformatike v mestu Beogradu. Tudi v Beogradu po oceni avtorja dostopnost in kakovost uporabljene računalniške strojne in programske opreme ne predstavlja ovir nadaljnjemu razvoju geoinformatike. Opozarja pa, da brez usklajene in sistematične rabe geoinformatike v prostorskem načrtovanju ne morejo pričakovati napredka na tem področju, kljub razmeroma visokim finančnim vložkom.

25.8. Izzivi prostorskega razvoja: primerjalna sinteza

Izzive običajno povezujemo z optimističnim stališčem do uresničljivosti ciljev, ki jih je težavno doseči. V obravnavi izzivov prostorskega razvoja mesta smo se osredotočili tako na izkoriščanje razvojnih priložnosti in prednosti, kot na uspešno reševanje razvojnih problemov ter izogibanje razvojnim oviram.

Avtorji v knjigi so obravnavali prostorski razvoj Ljubljane in Beograda z različnih vidikov, zato ne preseneča, da so izpostavljali tudi različne razvojne probleme in priložnosti. Ven-

darle je ob podrobnejši primerjalni analizi slednjih mogoče prepoznati nekaj razvojnih izzivov, ki posebej izstopajo. Lahko bi jih opredelili kot »sintezne izzive«, saj uspešno soočanje s posameznimi izmed njih rešuje številne razvojne probleme hkrati, njihovo skupno reševanje pa zajame večino problemov in priložnosti prostorskega razvoja, ki jih avtorji izpostavljajo v knjigi. Na bolj splošni ravni so nekateri razvojni izzivi podobni za obe obravnavani mesti, medtem ko se z njihovo podrobnejšo opredelitvijo razločneje pokažejo tudi razlike med mestoma. Med »sinteznimi prostorsko-razvojnimi izzivi« lahko izpostavimo zlasti naslednje:

- iskanje in uveljavljanje primernih gospodarskih, prebivalstvenih in drugih »razvojnih vsebin« v širšem mestnem središču;
- reševanje nakopičenih težav nenačrtnega, v Ljubljani v veliki meri razpršenega, v Beogradu pa v veliki meri nelegalnega sklenjenega širjenja mesta na bližnja ali bolj oddaljena suburbana in podeželska območja;
- soočanje z razvojnimi izzivi, ki jih prinaša vse starejše prebivalstvo obeh mest;
- posodobitev sistema mestnega in obmestnega potniškega prometa, z ustreznim sistemom ukrepov, ki bodo učinkovito vodili v smer pomembnega zmanjšanja prometa z osebnimi avtomobili, bistveno pa povečali uporabo javnega potniškega prometa in kolesarjenja;
- zmanjševanje ali odpravljanje negativnih učinkov dosedanjih primerov neustreznega prostorskega razvoja;
- ohranjanje in izboljševanje kakovosti življenjskega okolja in širših, tudi socialnih in gospodarskih, življenjskih razmer, ob vse doslednejšem sledenju načelom trajnostnega razvoja;
- ustreznejša vloga strateškega in izvedbenega prostorskega načrtovanja, na lokalni in regionalni ravni, v prostorskem razvoju mesta in širše mestne regije;
- vključevanje javnosti v različne faze načrtovanja in spremljanja prostorskega razvoja mesta, v smeri demokratizacije (e-)upravljanja z mesti in mestnimi regijami, ob ustreznem geoinformacijski podpori.

Med bolj specifične prostorsko-razvojne izzive, ki se nanašajo na izkoriščanje priložnosti, lahko v obeh mestih hkrati uvrstimo boljše izkoriščanje strateškega prometnega in geografskega položaja ter okrepitev regionalnega načrtovanja in regionalnega povezovanja. V Ljubljani lahko dodatno izpostavimo izzive kot so utrditev položaja mesta in mestne regije v mednarodnih omrežjih središč in regij, izkoriščanje ugodnih reliefnih razmer za nadaljnji razvoj kolesarjenja kot vse pomembnejše oblike mestnega prometa, ohranitev zvezdaste tlorisne zasnove mesta, pomembne z vidika trajnostne zasnove prometa ter kakovosti bivalnega okolja prebivalstva, izboljšanje kakovosti površinskih voda in posledično podtalnice ter bolj smotrno rabo slednje in gentrifikacijo mestnega jedra. V Beogradu je mogoče med posebnimi razvojnimi izzivi opredeliti izboljšanje položaja mesta in mestne regije v mednarodnih omrežjih središč in regij, možnosti za izkoriščanje sončne energije zaradi velike količine sončnih dni, vključevanje v evropske povezave vključno s predvidenim vstopom v Evropsko Unijo ter posodobitev oziroma razvoj prometa, na primer rečnega potniškega prometa in letalskega tovornega prometa.

V drugo skupino razvojnih izzivov, ki se nanašajo predvsem na reševanje razvojnih težav in izogibanje razvojnim oviram, lahko v Ljubljani na primer uvrstimo zmanjšanje ali odpravo naravne ogroženosti obstoječih poseljenih območij zaradi potresov ali poplav, preusmerjanje prihodnjih gradenj na manj ogrožena območja, krepitev središč v ožjem in širšem zaledju Ljubljane, posledično zmanjšanje pritiskov dnevnih migrantov na mestni oziroma primestni promet, približevanje ponudbe stanovanj v mestu količini in vrsti povpraševanja, načrtno (medijsko podprto) zmanjševanje negativnih stereotipov o nekaterih mestnih ali obmestnih soseskah, s ciljem izboljšanja lokalne identitete. V Beogradu lahko med tovrstne izzive uvrstimo na primer zmanjšanje ali odpravo naravne ogroženosti obstoječih večinoma ilegalno poseljenih reliefno razgibanih suburbanih območij zaradi erozije in plazovitosti, preusmerjanje prihodnjih gradenj na manj ogrožena območja, zmanjševanje neustrezne infrastrukturne in storitvene opremljenosti na območjih ilegalne poselitve ter razvoj rudarjenja v bližini glavnega mesta s čim manj negativnih vplivov na razvoj mesta, zlasti na promet, onesnaževanje zraka in vode ter na izgled pokrajine.

Zgornji pregled razvojnih izzivov nikakor ni popoln. Izdelan je na podlagi izbranih problemov in priložnosti prostorskega razvoja Ljubljane in Beograda, ki so se jih v svojih novejših raziskavah lotili avtorji poglavij. Podrobnejši izzivi, predstavljeni v knjigi, so že sami po sebi odraz merila obravnave mest in mestnih regij ter raziskovalnih usmeritev avtorjev. Izbor »sinteznih izzivov«, predstavljenih v tem poglavju, je skromen poskus sintetiziranja obsežnega zbranega gradiva. Izbor specifičnih izzivov pa je namenjen le predstavitvi njihove raznovrstnosti in širine, v kakršni so postavljeni pred prostorske raziskovalce, načrtovalce, upravljalce, nenazadnje pa tudi prebivalce Ljubljane in Beograda.

Knjigo smo se odločili pripraviti v angleščini. S tem smo želeli informacije in mnenja avtorjev o stanju in perspektivah prostorskega razvoja in njegovega načrtovanja narediti dostopne širši mednarodni javnosti. Z jezikovnega vidika nam zaradi finančnih in časovnih omejitev morda ni uspelo pripraviti tako kakovostnega izdelka, kot smo si želeli. Vendarle verjamemo, da bodo zbrana besedila in druga predstavljena gradiva, vključno z uporabljenimi in navedenimi viri, našla pomemben prostor med dokumenti o prostorskem razvoju in načrtovanju Ljubljane in Beograda v začetku 21. stoletja.

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List of figures

Figure 1: Territorial Development of Ljubljana.	16
Figure 2: Territorial Development of Belgrade.	26
Figure 3: Position of Ljubljana at the contact of major physical-geographical units and transport routes.	28
Figure 4: Cross-section of gravel accumulations of the Ljubljansko Polje plain. The depth of gravel accumulations and deep water table make feasible the construction of several-storey basements.	30
Figure 5: Due to the poor carrying capacity of the surface, the building of houses on the Ljubljansko Barje requires the piling.	31
Figure 6: Floods at Lipe on the Ljubljansko Barje.	34
Figure 7: Temperature differences in Ljubljana along the profile from Vižmarje to Črna Vas on the Ljubljansko Barje (26 December 1998; 23:00).	35
Figure 8: Confluence of Danube and Sava river (with protected island „Veliko ratno ostrvo“).	40
Figure 9: Sava river with its two islands – Ada Ciganlija (right) and Ada Medjica (left).	41
Figure 10: River Sava – island Ada Ciganlija and lake – recreation center.	42
Figure 11: Average annual quantity of underground waters obtained by wells of Belgrade spring.	43
Figure 12: Seismic activity of Belgrade and wider surrounding with isolines and zones of basic degree of seismicity (Mercali Scale).	49
Figure 13: A part from the map of the territory of Belgrade for which the cadastre of landslides and unstable slopes is made.	51
Figure 14: Urban settlements in Slovenia (SURS).	57
Figure 15: Central places in Slovenia in the middle of the first decade of the 21st century.	59
Figure 16: Long term development plan of SRS 1986-2000: Urban network of 15 regional centres and 43 local centres with city clusters (conurbations).	63
Figure 17: Polycentric urban system and development of wider urban areas.	64
Figure 18: Ljubljana as MEGA.	66
Figure 19: Funtional urban areas in Slovenia.	66
Figure 20: Position of Ljubljana in the southeastern part of Alpe-Adria-Pannonia.	69
Figure 21: Belts of more intensive development in Serbia.	75
Figure 22: Functional regions of Serbian urban centres.	81
Figure 23: Population development in the territory of the Urban Municipality of Ljubljana between 1945 and 2009.	87
Figure 24: Population development in the Ljubljana urban region by municipality between 1991 and 2007.	93
Figure 25: Population development in Ljubljana between 1991 and 2002.	96
Figure 26: Age structure of the population in the Urban Municipality of Ljubljana, as of 30 June 2006.	98
Figure 27: Age structure of the population in the Ljubljana urban region not including the Urban Municipality of Ljubljana, as of 30 June 2006.	99

Figure 28: Spatial-demographic changes and relations in Belgrade.	106
Figure 29: Natural and mechanical increase of the population, 1961 - 2007.	109
Figure 30: Natural movement of the population of the City of Belgrade, 1981 - 2007.	111
Figure 31: Fertility rates in Belgrade and central Serbia according to mother's age.	113
Figure 32: Sex structure of population of Belgrade in 2002.	114
Figure 33: Age-sex structure of population in 2002.	115
Figure 34: Population change (%) in municipalities (NUTS 5) in Slovenia in the period 1991-2002.	122
Figure 35: Travel-to-work migrations in Slovenia according to municipality of residence and municipality of work.	123
Figure 36: Polycentric urban system of Slovenia: distribution of urban settlements, towns, LLS and their role as »centres of (inter)national, regional, intermunicipal importance« in Strategy of spatial development of Slovenia (2004).	125
Figure 37: Distribution of jobs in 42 LLS (%) with »inward / outward openness«.	127
Figure 38: Factorial analysis, family status of population, Urban Municipality of Ljubljana, 1991.	145
Figure 39: The share of population with higher education, Urban Municipality of Ljubljana, 2002.	146
Figure 40: Local average income tax base per capita expressed as deviation (in %) from the average income tax base per capita in Urban Municipality of Ljubljana, 1999.	147
Figure 41: The share of the non-Slovene population by census district, Urban Municipality of Ljubljana, 1991.	150
Figure 42: Types of level-of-living in Urban Municipality of Ljubljana.	152
Figure 43: The perceived most attractive neighbourhoods for living in Urban Municipality of Ljubljana.	154
Figure 44: The perceived most unsafe neighbourhoods in Urban Municipality of Ljubljana.	155
Figure 45: Topophilia and topophobia of the neighbourhoods in Urban Municipality of Ljubljana.	157
Figure 46: Zones of social space of Belgrade.	171
Figure 47: Zones of physical space of Belgrade.	172
Figure 48: Canonical results: a) for the first pair of canonical variables; b) for the second pair of canonical variables (CSa - canonical results of factors of social space; CSb - canonical results of factors of physical space).	177
Figure 49: Structure of gross domestic (material) product by type of ownership, 2005.	184
Figure 50: Structure of gross domestic (material) product by economic activities, 2005.	185
Figure 51: Employees in Belgrade, 2002 - 2005.	186
Figure 52: Selected indicators of socio-economic development 2004.	191
Figure 53: Highway system in Slovenia.	199
Figure 54: Ljubljana bypass is also crossroad of main Slovenian highways A1 and A2; many times it is overloaded with traffic, so congestions occur daily.	201
Figure 55: Slovenska road is still main transport axe in the centre of Ljubljana; railway system in Ljubljana is unexploited and in form as it is today, contributes to road congestions.	204
Figure 56: Concept of logistic centres of Belgrade; logistic centre-distribution centre (LC-DC) - Ada Huja, highway and Batajnica.	215

Figure 57: Derelict urban areas in Ljubljana.	223
Figure 58: Redevelopment and new use of derelict urban areas in Ljubljana.	224
Figure 59: Location of low density and dispersed residential areas in Ljubljana.	226
Figure 60: Administrative division of the City of Belgrade (Belgrade urban region).	231
Figure 61: Functional type of settlements of the City of Belgrade (1971).	237
Figure 62: Functional type of settlements of the City of Belgrade (2002).	238
Figure 63: Degree of the urbanization of the settlements of the City of Belgrade (1971).	240
Figure 64: Degree of the urbanization of the settlements of the City of Belgrade (2002).	241
Figure 65: Belgrade metropolitan area in the Regional Spatial Plan of the City of Belgrade.	246
Figure 66: Daily migrants to the City of Belgrade and its surrounding (2002).	246
Figure 67: Summary map of regions of Ljubljana with respect to noise pollution.	255
Figure 68: Quality of water resources of Ljubljana (1997 - 2004).	259
Figure 69: Spatial development plan for the Urban Municipality of Ljubljana.	266
Figure 70: Environmentally controversial projects of the Spatial plans for the Urban Municipality of Ljubljana (2002).	267
Figure 71: Annual mean black smoke, SO ₂ and NO ₂ concentrations (µg/m ³) in Belgrade (Imission Level Value for black smoke per year: 50 µg/m ³ , ILVy SO ₂ = 50 µg/m ³ , ILVy NO ₂ = 60 µg/m ³).	270
Figure 72: Average number of days with excessive ILVs for black smoke, SO ₂ and NO ₂ in Belgrade.	270
Figure 73: Maximum annual concentrations registered in Belgrade, expressed in µg/m ³ (ILV for black smoke per day: 50 µg/m ³ , ILVd SO ₂ = 150 µg/m ³ , ILVd NO ₂ = 85 µg/m ³).	271
Figure 74: Percentage of II classriver waters in samples from some surface waters on the territory of Belgrade in 2007.	274
Figure 75: Map of risky industrial plants in the area of Belgrade.	279
Figure 76: Categorisation of the environment on the territory of the city of Belgrade.	282
Figure 77: »Ljubljana urban region (NUTS 3)« with 26 NUTS 5 municipalities.	292
Figure 78: Strategic spatial development plan of the City Municipality of Ljubljana (2007-2009).	299
Figure 79: Planned land use (2021) in General plan of Belgrade.	314
Figure 80: The purpose of an area in 2011 from the Regional Spatial Plan of the Administrative Area of Belgrade.	315
Figure 81: City of Belgrade e-governance chart.	319
Figure 82: URBINFO – Public spatial data information system of Urban Municipality of Ljubljana: an example of spatial query on land-use map.	330
Figure 83: URBINFO – an example of spatial query on the map of planned spatial legal acts.	330
Figure 84: "Service for citizens' initiatives" in Urban Municipality of Ljubljana is an example of a good practice of participatory e-governance: entering a new initiative is simple (a), response rate is very high, easily accessible and up-to-date (b).	331
Figure 85: Positioning citizens' e-remarks to the spatial plan of Urban Municipality of Ljubljana on the "Arnstein's ladder".	333
Figure 86: The user interface of Interactive map of Belgrade Land Development Public Agency.	345

List of tables

Table 1: Basic hydrological data on rivers in Belgrade zone and relevant hydrological surroundings.	41
Table 2: Wells of Belgrade spring and their capacities in 2003.	44
Table 3: Total quantity of produced water and the capacity of Belgrade water spring.	44
Table 4: Autonomous ecosystems (natural and artificial).	46
Table 5: Degree of consequences caused by natural disasters.	48
Table 6: Characteristics of natural conditions (limitations in the City of Belgrade according to the degree of the sustainability for construction).	52
Table 7: Population of the largest towns in Slovenia.	55
Table 8: Research on central places in Slovenia and position of Ljubljana in the hierarchy of central places.	58
Table 9: Urban settlements distribution in Serbia according to demographic size by Census 2002.	73
Table 10: Demographic size relation of the ten most numerous cities in Serbia, according to the Census 2002.	74
Table 11: Total, natural, and migration increase of the population of Ljubljana between 1945 and 1964.	89
Table 12: Total, natural, and migration increase of the population in the territory of the Administrative Unit of Ljubljana between 1965 and 1994.	90
Table 13: Total, natural, and migration increase of the population in the territory of the Ljubljana urban region and Slovenia between 1996 and 2007.	92
Table 14: Population development in the Ljubljana urban region (LUR) between 1991 and 2007.	92
Table 15: Total, natural, and migration increase in the population of the Urban Municipality of Ljubljana between 1995 and 2007.	95
Table 16: Changes in the population number of Belgrade, 1948 - 2002.	104
Table 17: Changes in population number by municipalities 1948 - 2002.	105
Table 18: Shares of migration and natural component in population growth of Belgrade.	109
Table 19: Population of urban municipality, urban centre and its catchment area (NUTS 4, LLS) of Ljubljana (2002).	124
Table 20: »Inward and outward openness« of 42 LLS in Slovenia.	127
Table 21: Total mass of daily migration in Belgrade.	131
Table 22: Spatial distribution of convergent daily migration of Belgrade.	132
Table 23: Spatial distribution of divergent daily migration of Belgrade.	132
Table 24: Regional distribution of convergent daily migration of workers, pupils and students of Belgrade.	133
Table 25: Regional distribution of divergent daily migration of workers, pupils and students of Belgrade.	134
Table 26: Territorial distribution of convergent daily migration within the City of Belgrade.	135

Table 27: Spatial distribution of divergent daily migration within the City of Belgrade.	135
Table 28: Convergent and divergent daily movements of labour among the urban municipalities within the urban tissue of Belgrade.	136
Table 29: Convergent and divergent daily movements of pupils and students among the urban municipalities within the urban tissue of Belgrade.	137
Table 30: Convergent and divergent daily migrations of workers, pupils and students of Belgrade by statistical types of settlements in 2002.	138
Table 31: Income distribution in Slovenia in 1998 and 2002.	143
Table 32: Share of population of Urban Municipality of Ljubljana in areas of different types of level-of-living.	152
Table 33: Characteristics of complex perceptual types of neighbourhoods based on combinations of intensive perceptions – in terms of topophilia and topophobia.	156
Table 34: Significance of selected factors in non-rotated and rotated matrix of factor load (for the social space of the city).	164
Table 35: Rotated matrix of factor loads and communality (for the social space of the city).	164
Table 36: Significance of selected factors in non-rotated and rotated matrices of factor loads (for the physical space of the city).	166
Table 37: Rotated matrix of factor loads and communality (for the physical space of the city).	166
Table 38: Mean values of factor results by zones of social space.	169
Table 39: Mean values of factor results by zones of physical space.	171
Table 40: Canonical coefficients and canonical correlations between social and physical factors.	176
Table 41: Privatizations in real sector on the territory of Belgrade, February 2006.	190
Table 42: Traffic on motorway crossing sections 1992 – 2009.	200
Table 43: Traffic increase index 2009/1992.	200
Table 44: Annual average daily traffic on sections of the Ljubljana Bypass between 2000 – 2008.	200
Table 45: Annual average daily traffic in March 2009 on selected roads in Ljubljana.	203
Table 46: Change in annual average daily traffic on chosen arteries in Ljubljana.	203
Table 47: The proportion of private vehicles, cargo vehicles of all kinds and buses on some of the roads in Ljubljana in 2004.	203
Table 48: General data on administrative area of Belgrade with changes (territorial division of 2005).	232
Table 49: Structure of activities in 2002 in administrative area of Belgrade.	234
Table 50: Changes in land use in the area of administrative area of Belgrade.	235
Table 51: Change of the number of settlements of the City of Belgrade according to the functional type.	236
Table 52: Change in number of settlements of administrative area of Belgrade according to categories of urbanisation.	242
Table 53: Sulfur dioxide air pollution in Ljubljana.	251
Table 54: Air pollution in Ljubljana from nitrogen oxides.	252

Table 55: Air pollution in Ljubljana due to ozone.	253
Table 56: Quality of the Ljubljana Sava and the Ljubljanica (1998 - 2005).	257
Table 57: Results of the water quality control for the Sava on the territory of Belgrade, 1998 – 2007.	272
Table 58: Results of the water quality control for the Danube on the territory of Belgrade, 1998 – 2007.	273
Table 59: Total number of samples and percentage of physical, chemical and bacteriological aberrations in the samples of drinking water taken from The Belgrade Waterworks, 2003 – 2007.	275
Table 60: Influence of urban functions on the pollution of the environment.	281
Table 61: The illegal construction in Belgrade for the period 1975-1997.	303

Index

Ljubljana

administrative area of the city	119
age structure of population	97
agrarian villages	29
agricultural population	56
air pollution	35, 250
Alps-Adriatic working community	68
apartment block neighbourhoods	94, 95
areas with good living conditions	148
areas with majority of non-Slovene population	151
baby boom generation	97
balanced regional development	65
Barje municipal waste landfill	260
basin location	250
bicycle traffic	205
bog	31
business zones	11
capital city	287
centre of international importance	55
city	55
city centre	94, 95
city centre, decline in	227
commuting	91, 98, 119
concentration of population	85
Construction Act	293
conurbation	16
cycling	265
daily (local) urban system	119
daily migrants	123
deagrarised population	56
decentralization	60
deconcentration of population	87
demographic characteristics	85
demographic processes	85
depopulation	85
derelict areas, redevelopment of	222
derelict housing areas	224
derelict industrial areas	224

derelict military areas	224
derelict urban areas	222
development, level of	297
dispersed settlement	225
dispersed urbanization	225
drinking water	30, 34, 257
earthquake, (1895)	14, 32
ecological problems	13
economic centralization	12
elevated inversions	36
emissions	250
Emona	9, 28
environmental pollution	250
environmental pressures	263
environmental problems	262
environmental protection	249, 263
ethnic segregation	149
ethnic status	144, 148
European (cohesion) regions	62
European traffic corridors	9
European transport corridor	28
exurbanization	94
factor ecology	145
family status	144
farming, abandonment of	86
flood hazards	32
fog	36, 250
fragility of geographical environment	263
functional urban area (FUA)	55, 66
General urban development plan	15
gentrification	96, 148
geographic information resources	328
geoinformatics and spatial development	323
geoinformatics, technological and informatics perspective of	324
geoinformatics, towards participatory planning	324
Golovec	27
Grad	27
gravitation influence	60
gray zones	224
ground inversions	36

groundwater	34, 257
Gruberjev prekop	33
heavy metals	260
household waste	261
households of higher incomes	147
housing	228
housing construction	11, 95, 99, 148, 228
housing deficit	99
ideal city	295
illegal waste dumps	260, 261
Ilirica (the Sava route)	28
immigrants	89, 91
income differentiation	153
independence, Slovenian	11
index of aging	97, 98
industrialization	86
inner-urban traffic	201
internal (infill) development	221
international airport	288
internationalisation of Ljubljana	287
kindergarten	98
Krim, Mt.	30
level-of-living	151
living environment, quality	227
Ljubljana Basin	9
Ljubljana Bypass	201
Ljubljana gate	9, 27
Ljubljana Public Transport (LPP)	202
Ljubljana urban region (LUR)	61, 287, 293
Ljubljana, five communes (municipalities) of	12, 289
Ljubljanaica	27, 32
Ljubljanska vrata (Ljubljana gate)	xx
Ljubljansko barje	27, 30
Ljubljansko polje	9, 27, 29
local communities	12
Local Labour System (LLS)	124
local wind	36
macro-regional centre	55
measurements of air pollution	250
MEGA	55, 66
migration	85

mixed land use	226
most non-attractive neighbourhoods for living	154
most unsafe neighbourhoods	154
motorization increase, Slovenia	199
National Development Strategy of the Republic of Slovenia	291
natural increase	85
neighbourhoods attractive for living	154
neighbourhoods of apartment blocks	147
network of central places	58
nitrates	258
nitrogen oxides	251
noise	254
noise pollution, areas with above average	254
older residential neighbourhoods	95
older suburbs	94
Osrednjeslovenska statistična regija (Central Slovenian Statistical Region)	61
outmigration of urban population	87
ozone	252
parking fees	202
perceptual spatial differentiation	153
perceptual types of neighbourhoods	156
peri-urbanization	94
pesticides	258
pokrajine (provinces)	61
Polhograjsko hribovje	27
polluted river	34
polycentric development	65, 287
polycentric urban development, Slovenia	62, 294
polycentric urban system	64
polycentric urban system, Slovenia	125
polycentrism	86
population growth	85
Posavsko hribovje	27
primacy rate of Ljubljana	289
primary schools	98
public transportation system	201
quarter communities	12
railway passenger transport	202
railway Vienna – Trieste	14, 28
Rašica	29

redevelopment of urban areas	222, 224
regional centre	11
Regional Development Agency of the Ljubljana Urban Region	293
regulation plan, (1869)	15
retail and services areas	227
retirement and nursing homes	98
re-urbanization	96
rigid zoning	226
Rožnik	27
rural-urban migration	99
satellite towns	90
Sava	9
Sava valley	29
sectoral development programmes and strategies	291
seismic hazards	31
self-cleaning capacities	262
service centres	11
settlement system	55
shopping centres	11
Šišenski hrib	27
Slovenian metropolis	295
Slovenica	28
Šmarna gora	29
smart city growth	295
social stratification of Slovenian society	243
socially deprived areas	248
socioeconomic status	144
socioeconomic stratification	143
sociogeographic structure	13
soil degradation	259
soil salinity	260
solid waste	260
Spatial Development Strategy of Slovenia, (2004)	55, 60, 125, 293, 194
Spatial Planning Act	293
spatial social differentiation	147
stationary traffic	202
strategic development document	291
strategic planning	287
Strategy for Development of Tourism	288
sub-Alpine regions	27
suburban areas	29, 263

suburban public transportation network	120
suburbanization	12, 16, 87, 148, 225
suburbanized areas	85
sulphur dioxide	251
sustainable city	295
sustainable development, environmental aspects of	268
sustainable principles	268
sustainable spatial development	264
sustainable urban development	249
tectonic depression	27
temperature inversion	250
town	57
traffic network	204
traffic pollution	205
twinning links	288
urban air pollution, predominant cause	253
urban area	56
urban climate	35
urban heat island	36
urban municipalities	60
Urban municipality of Ljubljana (UML)	11, 12, 287, 290
urban region	12
urban settlements	56
urban sprawl	94, 225
urbanization	16, 56, 85
URBINFO, spatial plan in digital form	328
vacant land, redevelopment of	222
vacation homes	94
variable noise, areas with	255
ventilation corridors	262
Vision of the city of Ljubljana by year 2025	295
volatile halogenated hydrocarbons	258
wastewater treatment plant	256
water pollution	256
water resources	32
workplaces	11, 12

Belgrade

Ada Ciganlija	42,274
administrative-territorial changes	229
agricultural areas	20
agricultural production	189
air pollution	269
air quality	269
applied geography	21
atmospheric disasters	52
Avala	38
Banat	37
Belgrade administrative area	230
Belgrade agglomeration	20, 77
Belgrade Metropolitan	245
Belgrade region	19
Belgrade settlement	19, 78, 230, 242
bio-geographic characteristics	45
black smoke	270
brownfield	193
business park	307
central city core	239, 241
chain stores	188
change in core-periphery relationship	106
chemical accidents, risks from	279
City Government of Belgrade	304
city of Belgrade	19, 316
climate	20, 39
coal zone	20
complex regional functional urban systems	77
crisis of industry	183
daily urban system	129
Danube	18, 37, 40
deagrarization	71, 236
deep crisis	301
degraded environment, restoration and improvements of	283
deindustrialization	181
delayed births	112
demetropolization	77
democratic changes since 2000	301
demographic aging	114

demographic characteristics	101
demographic concentration, Serbia	101
demographic development	101
demographic exodus	72
demographic processes	101, 106
depopulation of rural settlements	72
development axis	78
development strategy of the City of Belgrade	318
differences in migrations	117
diffusion of urbanization	72
directions of immigrations	109
disproportion in demographic development, Serbia	117
disproportion in regional development, Serbia	117
district, 6+1	25
drinking water	275
earthquakes	49
economic transition	182
“edge cities”	307
emigration of young professionals and students	302
employed	233
employed, structure of	233
energy resources	189
environment, main problems of	280
environment, priority measures in the protection of	285
environment, protection of	283
environment, state of, Belgrade	269
environmental pollution	282
European corridors	17
eutrophication	274
facilities of large capacities	193
factor ecology	159
family status	165
fertility rate	112
first regulation plans	22
first urban projects	22
floods	48, 50
forestation	20
Free Zone of Belgrade	189, 194
functional core zones	76
functional macro-region of Belgrade	316
functional regions of urban centres, Serbia	81

functional urban system	20
functional-spatial organization	19
General Plan of Belgrade to 2021, (2003)	311
General Plan of Belgrade, (1923)	22
General Plan of Belgrade, (1985)	310
Geographic Information System of Belgrade	344
geographical position	20
geoinformatics and spatial planning system, Belgrade	335
geoinformatics in planning in Belgrade, key institutions	343
greenfield	193
Grocka	107
hazardous industrial plants	279
hazardous waste	278
hilly terrains, central Serbia	38
housing segregation	165
illegal construction	303
illegal housing construction	244
imbalance in the sex structure of population	113
imigration	101
index of urban primacy	74
industrial zone	173
industrialization	18
industry	71, 188
influx of refugees	302
inner city centre	233
insufficient economic cohesion	192
insufficient utilization of potentials	192
interactive map with urban plans of Belgrade	344
Kaludjerica	107
"kiosk urbanisation"	304
Knez Mihailova Street	22
košava	39
Kosmaj	38
landfills	277
landslides	48, 51
largest demographic growth	301
low economic competitiveness	191
metropolitan of Belgrade	316
migration mobility	71, 165
minerals	47
municipalities, (17)	19

natural borders of the city	37
natural characteristics	21
natural development of population	110
natural hazards	47
natural increase of population	111, 112
navigable rivers	17
networking, cities	72
new poles of development	193
new polluters	272
new urban governance	308
nitrogen oxides	269
noise	278
Novi Beograd (New Belgrade)	23, 107, 185, 193
old urban core	23, 172
oldest city core	105
Pannonian plain	38
Panonian Basin	17
peri-urbanization	71
physical space	162
Plans of Belgrade, (1927, 1939, 1950, 1972, 2003)	22, 23
Poduvlje belt	37
population growth	101
Posavina belt	37
position	17, 37
poverty threshold, beneath the	302
privatization	190
public spaces	306
recovery	306, 310
recycling	278
regional distribution of daily migrants	133
Regional Spatial Plan of the Administrative Area of the City of Belgrade, (2004)	19, 24, 314
relief	38
reproductive model	113
rural exodus	101
rural population	72
rural settlements transformation	229
Sava	18, 37, 40
Savsko lake	42
seismic endangerment	48
selectivity of migrants	108
settlements, dispersed	244

settlements, functional diversification of	236
settlements, functional types of the	236
settlements, suburban	242
sewage network	276
shift in behavioural patterns	306
Singidunum	17
smaller urban areas	76
social areas	160
social aspects	21
soil pollution	276
soil quality	276
Sopot	107
spatial development of the city	37
spatial functional structure	229
Spatial Plan of Belgrade, (1981)	311
Spatial Plan of the City of Belgrade, (1980)	24
spatial segregation	302
Srem	37
Sremčica	107
stages of urbanization	105
standard of residence	165
strategic development directions, Belgrade metropolis	195
Strategy of Development of the City of Belgrade	196
structural and functional organization of Belgrade	159
structure of economic activities	189
suburban housing zone	173
suburban municipalities, seven	19, 243
suburban ring	247
suburban rural zone	173
suburbanization	71
sulphur dioxide	269
Šumadija	17, 37, 38
surface waters	40, 271, 274
territorial expansion	103, 229
tourism	189
trade recovery	190
traditional social status	165
traffic	20
traffic-geographic position	17
transport and communication, concept of development ..	215
transport infrastructure	209

transport, ecological impacts	218
transportation system	208, 209
underground water	43, 274, 275
unemployment	187
urban expansion	229
urban lifestyles	306
urban municipalities, (10)	19
urban population	83
urban services, malfunctions of	305
urban settlements network, Serbia	73
urban system, Serbia	83
urbanization, degree of	239
urbanization, Serbia	71
vital problems in daily life	301
waste disposal	277
water quality	271
water supply	44
zone of business centres	173
zone of extremely urban social status	169
zone of housing segregation	170
zone of rural social status	170
zone of substandard housing conditions	174
zone of suburban migration social status	170
zone of transitional social status	169
zones of physical space	170
zones of social space	169

List of authors

MSc Tijana Dabović, assistant, Faculty of Geography, University of Belgrade

PhD Mirjana Devedžić, associate professor, Faculty of Geography, University of Belgrade

PhD Dejan Djordjević, full professor, Faculty of Geography, University of Belgrade

MSc Aleksandar Djordjević, assistant, Faculty of Geography, University of Belgrade

PhD Dejan Filipović, associate professor, Faculty of Geography, University of Belgrade

MSc Dragica Gatarić, assistant, Faculty of Geography, University of Belgrade

PhD Mirko Grčić, full professor, Faculty of Geography, University of Belgrade

PhD Marko Krevs, assistant professor, Department of Geography, Faculty of Arts, University of Ljubljana

PhD Simon Kušar, assistant professor, Department of Geography, Faculty of Arts, University of Ljubljana

PhD Bogdan Lukić, assistant professor, Faculty of Geography, University of Belgrade

MSc Radmila Miletić, research assistant, Geographical Institute Jovan Cvijić of the Serbian Academy of Sciences and Arts, Belgrade

MSc Marija Nevenić, assistant, Faculty of Geography, University of Belgrade

PhD Danijela Obradović-Arsić, assistant, Faculty of Geography, University of Belgrade

PhD Darko Ogrin, associate professor, Department of Geography, Faculty of Arts, University of Ljubljana

PhD Matej Ogrin, assistant professor, Department of Geography, Faculty of Arts, University of Ljubljana

PhD Mirko Pak, full professor, Department of Geography, Faculty of Arts, University of Ljubljana

MSc Nataša Pichler-Milanović, senior research and planning consultant, Re-Forma R&D Int. (until 2009 researcher, Department of Geography, Faculty of Arts, University of Ljubljana)

PhD Dušan Plut, full professor, Department of Geography, Faculty of Arts, University of Ljubljana

PhD Ivan Ratkaj, assistant professor, Faculty of Geography, University of Belgrade

PhD Dejan Rebernik, associate professor, Department of Geography, Faculty of Arts, University of Ljubljana

PhD Velimir Šećerov, assistant professor, Faculty of Geography, University of Belgrade

PhD Metka Špes, associate professor, Department of Geography, Faculty of Arts, University of Ljubljana

PhD Srboľjub Stamenković+, full professor, Faculty of Geography, University of Belgrade

PhD Branka Tošić, associate professor, Faculty of Geography, University of Belgrade

PhD Dragutin Tošić, associate professor, Faculty of Geography, University of Belgrade

PhD Gordana Vojković, assistant professor, Faculty of Geography, University of Belgrade

MSc Zora Živanović, assistant, Faculty of Geography, University of Belgrade

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About the authors

The monograph is a work of twenty-seven authors from three institutions, the Department of Geography, Faculty of Arts, University of Ljubljana, different departments of the Geographical Faculty, University of Belgrade and the Geographical Institute Jovan Cvijić, Serbian Academy of Sciences and Arts, Belgrade. Their scientific, professional and educational work is focused on very wide range of fields within geography and spatial planning, from climatogeography, hydrogeography, landscape ecology, environmental geography to geographies of population, settlements, transportation, social, urban, economic geography, regional and urban planning. Their professional engagements are characterized by extensive interdisciplinary and international cooperation, and by transfer of knowledge gained in basic or applied research to their educational or applicative work.

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Original scientific work, a result of research cooperation of Slovenian and Serbian authors, brings contemporary and fresh theoretical and methodological approaches to urban analysis and spatial planning and represents a thorough upgrade to the existing knowledge about Ljubljana and Belgrade. The monograph is intended for professionals like spatial, urban and regional planners, who are concerned with urban spatial development. But also researchers and students from the fields of geography, spatial development, spatial planning and others will find its contents useful and inviting.

Jasmina Djordjević and Jernej Zupančič

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